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(54) Title: METHOD AND REAGENT FOR THE TREATMENT OF DISEASES OR CONDITIONS RELATED TO LEVELS OF VASCULAR ENDOTHELIAL GROWTH FACTOR RECEPTOR

(57) Abstract

Nucleic acid molecule which modulates the synthesis, expression and/or stability of an mRNA encoding one or more receptors of vascular endothelial growth factor.

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DESCRIPTION

Method and Reagent for the Treatment of Diseases or Conditions Related to Levels of Vascular Endothelial Growth Factor Receptor

Background Of The Invention

This application is a continuation-in-part of Pavco et al., U.S. Serial No. 60/005,974 all of which is hereby incorporated by reference herein (including drawings).

This invention relates to methods and reagents for the treatment of diseases or conditions relating to the levels of expression of vascular endothelial growth factor (VEGF) receptor(s).

The following is a discussion of relevant art, none of which is admitted to be prior art to the present invention.

VEGF, also referred to as vascular permeability factor (VPF) and vasculotropin, is a potent and highly specific mitogen of vascular endothelial cells (for a review see Ferrara, 1993 *Trends Cardiovas. Med.* 3, 244; Neufeld *et al.*, 1994 *Prog. Growth Factor Res.* 5, 89). VEGF induced neovascularization is implicated in various pathological conditions such as tumor angiogenesis, proliferative diabetic retinopathy, hypoxia-induced angiogenesis, rheumatoid arthritis, psoriasis, wound healing and others.

VEGF, an endothelial cell-specific mitogen, is a 34-45 kDa glycoprotein with a wide range of activities that include promotion of angiogenesis, enhancement of vascular-permeability and others. VEGF belongs to the platelet-derived growth factor (PDGF) family of growth factors with approximately 18% homology with the A and B chain of PDGF at the amino acid level. Additionally, VEGF contains the eight conserved cysteine residues common to all growth factors belonging to the PDGF family (Neufeld *et al.*, *supra*). VEGF protein is believed to exist

predominantly as disulfide-linked homodimers; monomers of VEGF have been shown to be inactive (Plouet *et al.*, 1989 *EMBO J.* 8, 3801).

VEGF exerts its influence on vascular endothelial cells by binding to specific high-affinity cell surface receptors. Covalent cross-linking experiments with ^{125}I-labeled VEGF protein have led to the identification of three high molecular weight complexes of 225, 195 and 175 kDa presumed to be VEGF and VEGF receptor complexes (Vaisman *et al.*, 1990 *J. Biol. Chem.* 265, 19461). Based on these studies VEGF-specific receptors of 180, 150 and 130 kDa molecular mass were predicted. In endothelial cells, receptors of 150 and the 130 kDa have been identified. The VEGF receptors belong to the superfamily of receptor tyrosine kinases (RTKs) characterized by a conserved cytoplasmic catalytic kinase domain and a hydrophylic kinase sequence. The extracellular domains of the VEGF receptors consist of seven immunoglobulin-like domains that are thought to be involved in VEGF binding functions.

The two most abundant and high-affinity receptors of VEGF are flt-1 (*fms*-like tyrosine kinase) cloned by Shibuya *et al.*, 1990 *Oncogene* 5, 519 and KDR (kinase-insert-domain-containing receptor) cloned by Terman *et al.*, 1991 *Oncogene* 6, 1677. The murine homolog of KDR, cloned by Mathews *et al.*, 1991, *Proc. Natl. Acad. Sci.*, USA, 88, 9026, shares 85% amino acid homology with KDR and is termed as flk-1 (fetal liver kinase-1). Recently it has been shown that the high-affinity binding of VEGF to its receptors is modulated by cell surface-associated heparin and heparin-like molecules (Gitay-Goren *et al.*, 1992 *J. Biol. Chem.* 267, 6093).

VEGF expression has been associated with several pathological states such as tumor angiogenesis, several forms of blindness, rheumatoid arthritis, psoriasis and others. Following is a brief summary of evidence supporting the involvement of VEGF in various diseases:

1) Tumor angiogenesis: Increased levels of VEGF gene expression have been reported in vascularized and edema-associated brain tumors (Berkman *et al.*, 1993 *J. Clini. Invest.* 91, 153). A more direct demostration of the role of VEGF in tumor angiogenesis was demonstrated by Jim Kim *et al.*, 1993 *Nature* 362,841 wherein, monoclonal antibodies against VEGF were successfully used to inhibit the growth of rhabdomyosarcoma, glioblastoma multiforme cells in nude mice. Similarly, expression of a dominant negative mutated form of the flt-1 VEGF receptor inhibits vascularization induced by human glioblastoma cells in nude mice (Millauer *et al.*, 1994, *Nature* 367, 576).

2) Ocular diseses: Aiello *et al.*, 1994 *New Engl. J. Med.* 331, 1480, showed that the ocular fluid, of a majority of patients suffering from diabetic retinopathy and other retinal disorders, contains a high concentration of VEGF. Miller *et al.*, 1994 *Am. J. Pathol.* 145, 574, reported elevated levels of VEGF mRNA in patients suffering from retinal ischemia. These observations support a direct role for VEGF in ocular diseases.

3) Psoriasis: Detmar *et al.*, 1994 *J. Exp. Med.* 180, 1141 reported that VEGF and its receptors were over-expressed in psoriatic skin and psoriatic dermal micro-vessels, suggesting that VEGF plays a significant role in psoriasis.

4) Rheumatoid arthritis: Immunohistochemistry and *in situ* hybridization studies on tissues from the joints of patients suffering from rheumatoid arthritis show an increased level of VEGF and its receptors (Fava *et al.*, 1994 *J. Exp. Med.* 180, 341). Additionally, Koch *et al.*, 1994 *J. Immunol.* 152, 4149, found that VEGF-specific antibodies were able to significantly reduce the mitogenic activity of synovial tissues from patients suffering from rheumatoid arthritis. These observations support a direct role for VEGF in rheumatoid arthritis.

In addition to the above data on pathological conditions involving excessive angiogenesis, a number of

studies have demonstrated that VEGF is both necessary and sufficient for neovascularization. Takashita *et al.*, 1995 *J. Clin. Invest.* 93, 662, demonstrated that a single injection of VEGF augmented collateral vessel development in a rabbit model of ischemia. VEGF also can induce neovascularization when injected into the cornea. Expression of the VEGF gene in CHO cells is sufficient to confer tumorigenic potential to the cells. Kim *et al.*, *supra* and Millauer *et al.*, *supra* used monoclonal antibodies against VEGF or a dominant negative form of flk-1 receptor to inhibit tumor-induced neovascularization.

During development, VEGF and its receptors are associated with regions of new vascular growth (Millauer *et al.*, 1993 *Cell* 72, 835; Shalaby *et al.*, 1993 *J. Clin. Invest.* 91, 2235). Furthermore, transgenic mice lacking either of the VEGF receptors are defective in blood vessel formation, infact these mouse do not survive; flk-1 appears to be required for differentiation of endothelial cells, while flt-1 appears to be required at later stages of vessel formation (Shalaby *et al.*, 1995 *Nature* 376, 62; Fung *et al.*, 1995 *Nature* 376, 66). Thus, these receptors must be present to properly signal endothelial cells or their precursors to respond to vascularization-promoting stimuli.

All of the conditions listed above, involve extensive vascularization. This hyper-stimulation of endothelial cells may be alleviated by VEGF antagonists. Thus most of the therapeutic efforts for the above conditions have concentrated on finding inhibitors of the VEGF protein.

Kim *et al.*, 1993 *Nature* 362, 841 have been successful in inhibiting VEGF-induced tumor growth and angiogenesis in nude mice by treating the mice with VEGF-specific monoclonal antibody.

Koch *et al.*, 1994 *J. Immunol.* 152, 4149 showed that the mitogenic activity of microvascular endothelial cells found in rheumatoid arthritis (RA) synovial tissue explants and the chemotactic property of endothelial cells

from RA synovial fluid can be neutralized significantly by treatment with VEGF-specific antibodies.

Ullrich *et al.*, International PCT Publication No. WO 94/11499 and Millauer *et al.*, 1994 *Nature* 367, 576 used a soluble form of flk-1 receptor (dominant-negative mutant) to prevent VEGF-mediated tumor angiogenesis in immunodeficient mice.

Kendall and Thomas, International PCT Publication No. WO 94/21679 describe the use of naturally occuring or recombinantly-engineered soluble forms of VEGF receptors to inhibit VEGF activity.

Robinson, International PCT Publication No. WO 95/04142 describes the use of antisense oligonucleotides targeted against VEGF RNA to inhibit VEGF expression.

Jellinek *et al.*, 1994 *Biochemistry* 33, 10450 describe the use of VEGF-specific high-affinity RNA aptamers to inhibit the binding of VEGF to its receptors.

Rockwell and Goldstein, International PCT Publication No. WO 95/21868, describe the use of anti-VEGF receptor monoclonal antibodies to neutralize the the effect of VEGF on endothelial cells.

Summary Of The Invention

The invention features novel nucleic acid-based techniques [e.g., enzymatic nucleic acid molecules (ribozymes), antisense nucleic acids, 2-5A antisense chimeras, triplex DNA, antisense nucleic acids containing RNA cleaving chemical groups (Cook *et al.*, U.S. Patent 5,359,051)] and methods for their use to down regulate or inhibit the expression of receptors of VEGF (VEGF-R).

In a preferred embodiment, the invention features use of one or more of the nucleic acid-based techniques to inhibit the expression of flt-1 and/or flk-1/KDR receptors.

By "inhibit" it is meant that the activity of VEGF-R or level of mRNAs or equivalent RNAs encoding VEGF-R is reduced below that observed in the absence of the nucleic acid. In one embodiment, inhibition with ribozymes

preferably is below that level observed in the presence of an enzymatically inactive RNA molecule that is able to bind to the same site on the mRNA, but is unable to cleave that RNA. In another embodiment, inhibition with anti-sense oligonucleotides is preferably below that level observed in the presence of for example, an oligonucleotide with scrambled sequence or with mismatches.

By "enzymatic nucleic acid molecule" it is meant an RNA molecule which has complementarity in a substrate binding region to a specified gene target, and also has an enzymatic activity which is active to specifically cleave target RNA. That is, the enzymatic RNA molecule is able to intermolecularly cleave RNA and thereby inactivate a target RNA molecule. This complementary regions allow sufficient hybridization of the enzymatic RNA molecule to the target RNA and thus permit cleavage. One hundred percent complementarity is preferred, but complementarity as low as 50-75% may also be useful in this invention. By "equivalent" RNA to VEGF-R is meant to include those naturally occurring RNA molecules in various animals, including human, mice, rats, rabbits, primates and pigs.

By "antisense nucleic acid" it is meant a non-enzymatic nucleic acid molecule that binds to target RNA by means of RNA-RNA or RNA-DNA or RNA-PNA (protein nucleic acid; Egholm *et al.*, 1993 *Nature* 365, 566) interactions and alters the activity of the target RNA (for a review see Stein and Cheng, 1993 *Science* 261, 1004).

By "2-5A antisense chimera" it is meant, an antisense oligonucleotide containing a 5' phosphorylated 2'-5'-linked adenylate residues. These chimeras bind to target RNA in a sequence-specific manner and activate a cellular 2-5A-dependent ribonuclease which, in turn, cleaves the target RNA (Torrence *et al.*, 1993 *Proc. Natl. Acad. Sci. USA* 90, 1300).

By "triplex DNA" it is meant an oligonucleotide that can bind to a double-stranded DNA in a sequence-specific manner to form a triple-strand helix. Formation of such

triple helix structure has been shown to inhibit transcription of the targeted gene (Duval-Valentin *et al.*, 1992 *Proc. Natl. Acad. Sci.USA* 89, 504).

By "gene" it is meant a nucleic acid that encodes an RNA.

By "complementarity" it is meant a nucleic acid that can form hydrogen bond(s) with other RNA sequence by either traditional Watson-Crick or other non-traditional types (for example, Hoogsteen type) of base-paired interactions.

Six basic varieties of naturally-occurring enzymatic RNAs are known presently. Each can catalyze the hydrolysis of RNA phosphodiester bonds in *trans* (and thus can cleave other RNA molecules) under physiological conditions. Table I summarizes some of the characteristics of these ribozymes. In general, enzymatic nucleic acids act by first binding to a target RNA. Such binding occurs through the target binding portion of a enzymatic nucleic acid which is held in close proximity to an enzymatic portion of the molecule that acts to cleave the target RNA. Thus, the enzymatic nucleic acid first recognizes and then binds a target RNA through complementary base-pairing, and once bound to the correct site, acts enzymatically to cut the target RNA. Strategic cleavage of such a target RNA will destroy its ability to direct synthesis of an encoded protein. After an enzymatic nucleic acid has bound and cleaved its RNA target, it is released from that RNA to search for another target and can repeatedly bind and cleave new targets. Thus, a single ribozyme molecule is able to cleave many molecules of target RNA. In addition, the ribozyme is a highly specific inhibitor of gene expression, with the specificity of inhibition depending not only on the base-pairing mechanism of binding to the target RNA, but also on the mechanism of target RNA cleavage. Single mismatches, or base-substitutions, near the site of cleavage can completely eliminate catalytic activity of a ribozyme.

Ribozymes that cleave the specified sites in VEGF-R mRNAs represent a novel therapeutic approach to treat tumor angiogenesis, ocular diseases, rhuematoid arthritis, psoriasis and others. Applicant indicates that ribozymes are able to inhibit the activity of VEGF-R (specifically flt-1 and flk-1/KDR) and that the catalytic activity of the ribozymes is required for their inhibitory effect. Those of ordinary skill in the art will find that it is clear from the examples described that other ribozymes that cleave VEGF-R mRNAs may be readily designed and are within the invention.

In preferred embodiments of this invention, the enzymatic nucleic acid molecule is formed in a hammerhead or hairpin motif, but may also be formed in the motif of a hepatitis delta virus, group I intron or RNaseP RNA (in association with an RNA guide sequence) or *Neurospora* VS RNA. Examples of such hammerhead motifs are described by Rossi *et al.*, 1992, *AIDS Research and Human Retroviruses* 8, 183, of hairpin motifs by Hampel *et al.*, EP0360257, Hampel and Tritz, 1989 *Biochemistry* 28, 4929, and Hampel *et al.*, 1990 *Nucleic Acids Res.* 18, 299, and an example of the hepatitis delta virus motif is described by Perrotta and Been, 1992 *Biochemistry* 31, 16; of the RNaseP motif by Guerrier-Takada *et al.*, 1983 *Cell* 35, 849, *Neurospora* VS RNA ribozyme motif is described by Collins (Saville and Collins, 1990 *Cell* 61, 685-696; Saville and Collins, 1991 *Proc. Natl. Acad. Sci. USA* 88, 8826-8830; Collins and Olive, 1993 *Biochemistry* 32, 2795-2799) and of the Group I intron by Cech *et al.*, U.S. Patent 4,987,071. These specific motifs are not limiting in the invention and those skilled in the art will recognize that all that is important in an enzymatic nucleic acid molecule of this invention is that it has a specific substrate binding site which is complementary to one or more of the target gene RNA regions, and that it have nucleotide sequences within or surrounding that substrate binding site which impart an RNA cleaving activity to the molecule.

In a preferred embodiment the invention provides a method for producing a class of enzymatic cleaving agents which exhibit a high degree of specificity for the RNA of a desired target. The enzymatic nucleic acid molecule is preferably targeted to a highly conserved sequence region of target mRNAs encoding VEGF-R proteins (specifically flt-1 and flk-1/KDR) such that specific treatment of a disease or condition can be provided with either one or several enzymatic nucleic acids. Such enzymatic nucleic acid molecules can be delivered exogenously to specific tissue or cellular targets as required. Alternatively, the ribozymes can be expressed from DNA and/or RNA vectors that are delivered to specific cells.

Synthesis of nucleic acids greater than 100 nucleotides in length is difficult using automated methods, and the therapeutic cost of such molecules is prohibitive. In this invention, small nucleic acid motifs (*e.g.*, antisense oligonucleotides, hammerhead or the hairpin ribozymes) are used for exogenous delivery. The simple structure of these molecules increases the ability of the nucleic acid to invade targeted regions of the mRNA structure. However, these nucleic acid molecules can also be expressed within cells from eukaryotic promoters (*e.g.*, Izant and Weintraub, 1985 *Science* 229, 345; McGarry and Lindquist, 1986 *Proc. Natl. Acad. Sci.* USA 83, 399; Sullenger-Scanlon *et al.*, 1991, *Proc. Natl. Acad. Sci. USA*, 88, 10591-5; Kashani-Sabet *et al.*, 1992 *Antisense Res. Dev.*, 2, 3-15; Dropulic *et al.*, 1992 *J. Virol*, 66, 1432-41; Weerasinghe *et al.*, 1991 *J. Virol*, 65, 5531-4; Ojwang *et al.*, 1992 *Proc. Natl. Acad. Sci. USA* 89, 10802-6; Chen *et al.*, 1992 *Nucleic Acids Res.*, 20, 4581-9; Sarver *et al.*, 1990 *Science* 247, 1222-1225; Thompson *et al.*, 1995 *Nucleic Acids Res.* 23, 2259). Those skilled in the art realize that any nucleic acid can be expressed in eukaryotic cells from the appropriate DNA/RNA vector. The activity of such nucleic acids can be augmented by their release from the primary transcript by a ribozyme (Draper

et al., PCT WO93/23569, and Sullivan *et al.*, PCT WO94/02595, both hereby incorporated in their totality by reference herein; Ohkawa *et al.*, 1992 Nucleic Acids Symp. Ser., 27, 15-6; Taira *et al.*, 1991, Nucleic Acids Res., 19, 5125-30; Ventura *et al.*, 1993 Nucleic Acids Res., 21, 3249-55; Chowrira *et al.*, 1994 J. Biol. Chem. 269, 25856).

Such nucleic acids are useful for the prevention of the diseases and conditions discussed above, and any other diseases or conditions that are related to the levels of VEGF-R (specifically flt-1 and flk-1/KDR) in a cell or tissue.

By "related" is meant that the reduction of VEGF-R (specifically flt-1 and flk-1/KDR) RNA levels and thus reduction in the level of the respective protein will relieve, to some extent, the symptoms of the disease or condition.

Ribozymes are added directly, or can be complexed with cationic lipids, packaged within liposomes, or otherwise delivered to target cells or tissues. The nucleic acid or nucleic acid complexes can be locally administered to relevant tissues ex vivo, or in vivo through injection, infusion pump or stent, with or without their incorporation in biopolymers. In preferred embodiments, the ribozymes have binding arms which are complementary to the sequences in Tables II to IX. Examples of such ribozymes also are shown in Tables II to IX. Examples of such ribozymes consist essentially of sequences defined in these Tables. By "consists essentially of" is meant that the active ribozyme contains an enzymatic center equivalent to those in the examples, and binding arms able to bind mRNA such that cleavage at the target site occurs. Other sequences may be present which do not interfere with such cleavage.

In another aspect of the invention, ribozymes that cleave target RNA molecules and inhibit VEGF-R (specifically flt-1 and flk-1/KDR) activity are expressed from transcription units inserted into DNA or RNA vectors. The

recombinant vectors are preferably DNA plasmids or viral vectors. Ribozyme expressing viral vectors could be constructed based on, but not limited to, adeno-associated virus, retrovirus, adenovirus, or alphavirus. Preferably, the recombinant vectors capable of expressing the ribozymes are delivered as described above, and persist in target cells. Alternatively, viral vectors may be used that provide for transient expression of ribozymes. Such vectors might be repeatedly administered as necessary. Once expressed, the ribozymes cleave the target mRNA. Delivery of ribozyme expressing vectors could be systemic, such as by intravenous or intramuscular administration, by administration to target cells ex-planted from the patient followed by reintroduction into the patient, or by any other means that would allow for introduction into the desired target cell.

By "vectors" is meant any nucleic acid- and/or viral-based technique used to deliver a desired nucleic acid.

Other features and advantages of the invention will be apparent from the following description of the preferred embodiments thereof, and from the claims.

Description Of The Preferred Embodiments

First the drawings will be described briefly.

Drawings

Figure 1 is a diagrammatic representation of the hammerhead ribozyme domain known in the art. Stem II can be ≥ 2 base-pair long.

Figure 2a is a diagrammatic representation of the hammerhead ribozyme domain known in the art; Figure 2b is a diagrammatic representation of the hammerhead ribozyme as divided by Uhlenbeck (1987, *Nature*, 327, 596-600) into a substrate and enzyme portion; Figure 2c is a similar diagram showing the hammerhead divided by Haseloff and Gerlach (1988, *Nature*, 334, 585-591) into two portions; and Figure 2d is a similar diagram showing the hammerhead

divided by Jeffries and Symons (1989, *Nucl. Acids. Res.*, 17, 1371-1371) into two portions.

Figure 3 is a diagramatic representation of the general structure of a hairpin ribozyme. Helix 2 (H2) is provided with a least 4 base pairs (*i.e.*, n is 1, 2, 3 or 4) and helix 5 can be optionally provided of length 2 or more bases (preferably 3 - 20 bases, *i.e.*, m is from 1 - 20 or more). Helix 2 and helix 5 may be covalently linked by one or more bases (*i.e.*, r is ≥ 1 base). Helix 1, 4 or 5 may also be extended by 2 or more base pairs (*e.g.*, 4 - 20 base pairs) to stabilize the ribozyme structure, and preferably is a protein binding site. In each instance, each N and N' independently is any normal or modified base and each dash represents a potential base-pairing interaction. These nucleotides may be modified at the sugar, base or phosphate. Complete base-pairing is not required in the helices, but is preferred. Helix 1 and 4 can be of any size (*i.e.*, o and p is each independently from 0 to any number, *e.g.*, 20) as long as some base-pairing is maintained. Essential bases are shown as specific bases in the structure, but those in the art will recognize that one or more may be modified chemically (abasic, base, sugar and/or phosphate modifications) or replaced with another base without significant effect. Helix 4 can be formed from two separate molecules, i.e., without a connecting loop. The connecting loop when present may be a ribonucleotide with or without modifications to its base, sugar or phosphate. "q" is ≥ 2 bases. The connecting loop can also be replaced with a non-nucleotide linker molecule. H refers to bases A, U, or C. Y refers to pyrimidine bases. "_____" refers to a covalent bond.

Figure 4 is a representation of the general structure of the hepatitis delta virus ribozyme domain known in the art.

Figure 5 is a representation of the general structure of the VS RNA ribozyme domain.

Figure 6 is a schematic representation of an RNAseH accessibility assay. Specifically, the left side of Figure 6 is a diagram of complementary DNA oligonucleotides bound to accessible sites on the target RNA. Complementary DNA oligonucleotides are represented by broad lines labeled A, B, and C. Target RNA is represented by the thin, twisted line. The right side of Figure 6 is a schematic of a gel separation of uncut target RNA from a cleaved target RNA. Detection of target RNA is by autoradiography of body-labeled, T7 transcript. The bands common to each lane represent uncleaved target RNA; the bands unique to each lane represent the cleaved products.

Figure 7 shows the effect of hammerhead ribozymes targeted against flt-1 receptor on the binding of VEGF to the surface of human microvascular endothelial cells. Sequences of the ribozymes used are shown in Table II; the length of stem II region is 3 bp. The hammerhead ribozymes were chemically modified such that the ribozyme consists of ribose residues at five positions (see Figure 11); U4 and U7 positions contain 2'-NH_2 modifications, the remaining nucleotide positions contain 2'-*O*-methyl substitutions; four nucleotides at the 5' terminus contains phosphorothioate substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose. The results of two separate experiments are shown as separate bars for each set. Each bar represents the average of triplicate samples. The standard deviation is shown with error bars. For the flt-1 data, 500 nM ribozyme (3:1 charge ratio with LipofectAMINE®) was used. Control 1-10 is the control for ribozymes 307-2797, control 11-20 is the control for ribozymes 3008-5585. The Control 1-10 and Control 11-20 represent the treatment of cells with LipofectAMINE® alone without any ribozymes.

Figure 8 shows the effect of hammerhead ribozymes targeted against KDR receptor on the binding of VEGF to KDR on the surface of human microvascular endothelial

cells. Sequences of the ribozymes used are shown in Table IV; the length of stem II region is 3 bp. The hammerhead ribozymes were chemically modified such that the ribozyme consists of ribose residues at five positions (see Figure 11); U4 and U7 positions contain 2'-NH_2 modifications, the remaining nucleotide positions contain 2'-*O*-methyl substitutions; four nucleotides at the 5' terminus contains phosphorothioate substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose. The Control 1-10 and Control 11-20 represent the treatment of cells with LipofectAMINE® alone without any ribozymes. Irrel. RZ, is a control experiment wherein the cells are treated with a non-KDR-targeted ribozyme complexed with Lipofectamine®. 200 nM ribozyme (3:1 charge ratio with LipofectAMINE®) was used. In addition to the KDR-targeted ribozymes, the effect on VEGF binding of a ribozyme targeted to an irrelevant mRNA (irrel. RZ) is also shown. Because the affinity of KDR for VEGF is about 10-fold lower than the affinity of flt-1 for VEGF, a higher concentration of VEGF was used in the binding assay.

Figure 9 shows the specificity of hammerhead ribozymes targeted against flt-1 receptor. Inhibition of the binding of VEGF, urokinase plasminogen activator (UPA) and fibroblast growth factor (FGF) to their corresponding receptors as a function of anti-FLT ribozymes is shown. The sequence and description of the ribozymes used are as described under Figure 7 above. The average of triplicate samples is given; percent inhibition as calculated below.

Figure 10 shows the inhibition of the proliferation of Human aortic endothelial cells (HAEC) mediated by phosphorothioate antisense oligodeoxynucleotides targeted against human KDR receptor RNA. Cell proliferation (O.D. 490) as a function of antisense oligodeoxynucleotide concentration is shown. KDR 21AS represents a 21 nt phosphorothioate antisense oligodeoxynucleotide targeted against KDR RNA. KDR 21 Scram represents a 21 nt

phosphorothioate oligodeoxynucleotide having a scrambled sequence. LF represents the lipid carrier Lipofectin.

Figure 11 shows *in vitro* cleavage of flt-1 RNA by hammerhead ribozymes. A) diagrammatic representation of hammerhead ribozymes targeted against flt-1 RNA. The hammerhead (HH) ribozymes were chemically modified such that the ribozyme consists of ribose residues at five positions; U4 and U7 positions contain 2'-NH_2 modifications, the remaining nucleotide positions contain 2'-O-methyl substitutions; four nucleotides at the 5' terminus contains phosphorothioate substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose (designated as 3'-iH). 1358 HH-A and 4229 HH-A contain 3 base-paired stem II region. 1358 HH-B and 4229 HH-B contain 4 base-paired stem II region. B) and C) shows *in vitro* cleavage kinetics of HH ribozymes targeted against sites 1358 and 4229 within the flt-1 RNA.

Figure 12 shows inhibition of human microvascular endothelial cell proliferation mediated by anti-flt-1 hammerhead ribozymes. A) Diagrammatic representation of hammerhead (HH) ribozymes targeted against sites 1358 and 4229 within the the flt-1 RNA. B) Graphical representation of the inhibition of cell proliferation mediated by 1358HH and 4229HH ribozymes.

Figure 13 shows inhibition of human microvascular endothelial cell proliferation mediated by anti-KDR hammerhead ribozymes. The figure is a graphical representation of the inhibition of cell proliferation mediated by hammerhead ribozymes targeted against sites 527, 730, 3702 and 3950 within the KDR RNA. Irrelevant HH RZ is a hammerhead ribozyme targeted to an irrelevant target. All of these ribozymes, including the Irrelevant HH RZ, were chemically modified such that the ribozyme consists of ribose residues at five positions; U4 and U7 positions contain 2'-NH_2 modifications, the remaining nucleotide positions contain 2'-*O*-methyl substitutions; four

nucleotides at the 5' termini contain phosphorothioate substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose (3'-iH).

Figure 14 shows *in vitro* cleavage of KDR RNA by hammerhead ribozymes. The hammerhead (HH) ribozymes were chemically modified such that the ribozyme consists of ribose residues at five positions; U4 and U7 positions contain 2'-NH_2 modifications, the remaining nucleotide positions contain 2'-*O*-methyl substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose (designated as 3'-iH). 726 HH and 527 HH contain 4 base-paired stem II region. Percent *in vitro* cleavage kinetics as a function of time of HH ribozymes targeted against sites 527 and 726 within the KDR RNA is shown.

Figure 15 shows *in vitro* cleavage of KDR RNA by hammerhead ribozymes. The hammerhead (HH) ribozymes were chemically modified such that the ribozyme consists of ribose residues at five positions; U4 and U7 positions contain 2'-NH_2 modifications, the remaining nucleotide positions contain 2'-*O*-methyl substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose (designated as 3'-iH). 3702 HH and 3950 HH contain 4 base-paired stem II region. Percent*in vitro* cleavage kinetics as a function of time of HH ribozymes targeted against sites 3702 and 3950 within the KDR RNA is shown.

Figure 16 shows *in vitro* cleavage of RNA by hammerhead ribozymes that are targeted to sites that are conserved between flt-1 and KDR RNA. The hammerhead (HH) ribozymes were chemically modified such that the ribozyme consists of ribose residues at five positions; U4 and U7 positions contain 2'-NH_2 modifications, the remaining nucleotide positions contain 2'-*O*-methyl substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose (designated as 3'-iH).

FLT/KDR-I HH ribozyme was synthesized with either a 4 base-paired or a 3 base-paired stem II region. FLT/KDR-I HH can cleave site 3388 within flt-1 RNA and site 3151 within KDR RNA. Percent *in vitro* cleavage kinetics as a function of time of HH ribozymes targeted against sites 3702 and 3950 within the KDR RNA is shown.

Figure 17 shows inhibition of human microvascular endothelial cell proliferation mediated by anti-KDR and anti-flt-1 hammerhead ribozymes. The figure is a graphical representation of the inhibition of cell proliferation mediated by hammerhead ribozymes targeted against sites KDR sites-527, 726 or 3950 or flt-1 site 4229. The figure also shows enhanced inhibition of cell proliferation by a combination of flt-1 and KDR hammerhead ribozymes. 4229+527, indicates the treatment of cells with both the flt 4229 and the KDR 527 ribozymes. 4229+726, indicates the treatment of cells with both the flt 4229 and the KDR 726 ribozymes. 4229+3950, indicates the treatment of cells with both the flt 4229 and the KDR 3950 ribozymes. VEGF -, indicates the basal level of cell proliferation in the absence of VEGF. A, indicates catalytically active ribozyme; I, indicates catalytically inactive ribozyme. All of these ribozymes were chemically modified such that the ribozyme consists of ribose residues at five positions; U4 and U7 positions contain 2'-NH_2 modifications, the remaining nucleotide positions contain 2'-*O*-methyl substitutions; four nucleotides at the 5' termini contain phosphorothioate substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose (3'-iH).

Figure 18 shows the inhibition of VEGF-induced angiogenesis in rat cornea mediated by anti-flt-1 hammerhead ribozyme. All of these ribozymes were chemically modified such that the ribozyme consists of ribose residues at five positions; U4 position contains 2'-*C*-allyl modifications, the remaining nucleotide positions contain 2'-*O*-methyl substitutions; four nucleotides at the 5' termini contain

phosphorothioate substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose (3'-iH). A decrease in the Surface Area corresponds to a reduction in angiogenesis. VEGF alone, corresponds to treatment of the cornea with VEGF and no ribozymes. Vehicle alone, corresponds to the treatment of the cornea with the carrier alone and no VEGF. This control gives a basal level of Surface Area. Active 4229 HH, corresponds to the treatment of cornea with the flt-1 4229 HH ribozyme in the absence of any VEGF. This control also gives a basal level of Surface Area. Active 4229 HH + VEGF, corresponds to the co-treatment of cornea with the flt-1 4229 HH ribozyme and VEGF. Inactive 4229 HH + VEGF, corresponds to the co-treatment of cornea with a catalytically inactive version of 4229 HH ribozyme and VEGF.

Ribozymes

Ribozymes of this invention block to some extent VEGF-R (specifically flt-1 and flk-1/KDR) production and can be used to treat disease or diagnose such disease. Ribozymes will be delivered to cells in culture, to cells or tissues in animal models of angiogenesis and/or RA and to human cells or tissues *ex vivo* or *in vivo*. Ribozyme cleavage of VEGF-R RNAs (specifically RNAs that encode flt-1 and flk-1/KDR) in these systems may alleviate disease symptoms.

Target sites

Targets for useful ribozymes can be determined as disclosed in Draper *et al.*, International PCT Publication No. WO 95/13380, and hereby incorporated by reference herein in totality. Other examples include the following PCT applications which concern inactivation of expression of disease-related genes: WO 95/23225, WO 95/13380, WO 94/02595, incorporated by reference herein. Rather than repeat the guidance provided in those documents here, below are provided specific examples of such methods, not

limiting to those in the art. Ribozymes to such targets are designed as described in those applications and synthesized to be tested *in vitro* and *in vivo*, as also described.

The sequence of human and mouse flt-1, KDR and/or flk-1 mRNAs were screened for optimal ribozyme target sites using a computer folding algorithm. Hammerhead or hairpin ribozyme cleavage sites were identified. These sites are shown in Tables II to IX (all sequences are 5' to 3' in the tables; X can be any base-paired sequence, the actual sequence is not relevant here). The nucleotide base position is noted in the Tables as that site to be cleaved by the designated type of ribozyme. While mouse and human sequences can be screened and ribozymes thereafter designed, the human targeted sequences are of most utility. However, as discussed in Stinchcomb *et al.*, "Method and Composition for Treatment of Restenosis and Cancer Using Ribozymes," filed May 18, 1994, U.S.S.N. 08/245,466, mouse targeted ribozymes may be useful to test efficacy of action of the ribozyme prior to testing in humans. The nucleotide base position is noted in the Tables as that site to be cleaved by the designated type of ribozyme.

Hammerhead or hairpin ribozymes were designed that could bind and cleave target RNA in a sequence-specific manner. The ribozymes were individually analyzed by computer folding (Jaeger *et al.*, 1989 *Proc. Natl. Acad. Sci. USA*, 86, 7706) to assess whether the ribozyme sequences fold into the appropriate secondary structure. Those ribozymes with unfavorable intramolecular interactions between the binding arms and the catalytic core were eliminated from consideration. Varying binding arm lengths can be chosen to optimize activity.

Referring to Figure 6, mRNA is screened for accessible cleavage sites by the method described generally in Draper *et al.*, PCT WO93/23569, hereby incorporated by reference herein. Briefly, DNA oligonucleotides

complementary to potential hammerhead or hairpin ribozyme cleavage sites were synthesized. A polymerase chain reaction is used to generate substrates for T7 RNA polymerase transcription from human and mouse flt-1, KDR and/or flk-1 cDNA clones. Labeled RNA transcripts are synthesized *in vitro* from the templates. The oligonucleotides and the labeled transcripts were annealed, RNAseH was added and the mixtures were incubated for the designated times at 37°C. Reactions are stopped and RNA separated on sequencing polyacrylamide gels. The percentage of the substrate cleaved is determined by autoradiographic quantitation using a PhosphorImaging system. From these data, hammerhead or hairpin ribozyme sites are chosen as the most accessible.

Ribozymes of the hammerhead or hairpin motif were designed to anneal to various sites in the mRNA message. The binding arms are complementary to the target site sequences described above. The ribozymes were chemically synthesized. The method of synthesis used follows the procedure for normal RNA synthesis as described in Usman *et al.*, 1987 *J. Am. Chem. Soc.*, 109, 7845; Scaringe *et al.*, 1990 *Nucleic Acids Res.*, 18, 5433; and Wincott *et al.*, 1995 *Nucleic Acids Res.* 23, 2677-2684 and makes use of common nucleic acid protecting and coupling groups, such as dimethoxytrityl at the 5'-end, and phosphoramidites at the 3'-end. Small scale synthesis were conducted on a 394 Applied Biosystems, Inc. synthesizer using a modified 2.5 μmol scale protocol with a 5 min coupling step for alkylsilyl protected nucleotides and 2.5 min coupling step for 2'-*O*-methylated nucleotides. Table XI outlines the amounts, and the contact times, of the reagents used in the synthesis cycle. A 6.5-fold excess (163 μL of 0.1 M = 16.3 μmol) of phosphoramidite and a 24-fold excess of *S*-ethyl tetrazole (238 μL of 0.25 M = 59.5 μmol) relative to polymer-bound 5'-hydroxyl was used in each coupling cycle. Average coupling yields on the 394 Applied Biosystems, Inc. synthesizer, determined by

colorimetric quantitation of the trityl fractions, were 97.5-99%. Other oligonucleotide synthesis reagents for the 394 Applied Biosystems, Inc. synthesizer: detritylation solution was 2% TCA in methylene chloride (ABI); capping was performed with 16% *N*-methyl imidazole in THF (ABI) and 10% acetic anhydride/10% 2,6-lutidine in THF (ABI); oxidation solution was 16.9 mM I_2, 49 mM pyridine, 9% water in THF (Millipore). B & J Synthesis Grade acetonitrile was used directly from the reagent bottle. *S*-Ethyl tetrazole solution (0.25 M in acetonitrile) was made up from the solid obtained from American International Chemical, Inc.

Deprotection of the RNA was performed as follows. The polymer-bound oligoribonucleotide, trityl-off, was transferred from the synthesis column to a 4mL glass screw top vial and suspended in a solution of methylamine (MA) at 65 °C for 10 min. After cooling to -20 °C, the supernatant was removed from the polymer support. The support was washed three times with 1.0 mL of EtOH:MeCN:H_2O/3:1:1, vortexed and the supernatant was then added to the first supernatant. The combined supernatants, containing the oligoribonucleotide, were dried to a white powder.

The base-deprotected oligoribonucleotide was resuspended in anhydrous TEA•HF/NMP solution (250 µL of a solution of 1.5mL *N*-methylpyrrolidinone, 750 µL TEA and 1.0 mL TEA•3HF to provide a 1.4M HF concentration) and heated to 65°C for 1.5 h. The resulting, fully deprotected, oligomer was quenched with 50 mM TEAB (9 mL) prior to anion exchange desalting.

For anion exchange desalting of the deprotected oligomer, the TEAB solution was loaded onto a Qiagen 500® anion exchange cartridge (Qiagen Inc.) that was prewashed with 50 mM TEAB (10 mL). After washing the loaded cartridge with 50 mM TEAB (10 mL), the RNA was eluted with 2 M TEAB (10 mL) and dried down to a white powder.

Inactive hammerhead ribozymes were synthesized by substituting a U for G_5 and a U for A_{14} (numbering from

Hertel, K. J., *et al.*, 1992, Nucleic Acids Res., 20, 3252).

The average stepwise coupling yields were >98% (Wincott *et al.*, 1995 *Nucleic Acids Res.* 23, 2677-2684). Hairpin ribozymes are synthesized in two parts and annealed to reconstruct the active ribozyme (Chowrira and Burke, 1992 *Nucleic Acids Res.*, 20, 2835-2840). Ribozymes are also synthesized from DNA templates using bacteriophage T7 RNA polymerase (Milligan and Uhlenbeck, 1989, *Methods Enzymol.* 180, 51).

All ribozymes are modified extensively to enhance stability by modification with nuclease resistant groups, for example, 2'-amino, 2'-*C*-allyl, 2'-flouro, 2'-*O*-methyl, 2'-H (for a review see Usman and Cedergren, 1992 *TIBS* 17, 34; Usman *et al.*, 1994 *Nucleic Acids Symp. Ser.* 31, 163). Ribozymes are purified by gel electrophoresis using general methods or are purified by high pressure liquid chromatography (HPLC; See Usman *et al.*, PCT Publication No. WO95/23225, the totality of which is hereby incorporated herein by reference) and are resuspended in water.

The sequences of the ribozymes that are chemically synthesized, useful in this study, are shown in Tables II to IX. Those in the art will recognize that these sequences are representative only of many more such sequences where the enzymatic portion of the ribozyme (all but the binding arms) is altered to affect activity. Stem-loop IV sequence of hairpin ribozymes listed in for example Table III (5'-CACGUUGUG-3') can be altered (substitution, deletion, and/or insertion) to contain any sequence, provided a minimum of two base-paired stem structure can form. The sequences listed in Tables II to IX may be formed of ribonucleotides or other nucleotides or non-nucleotides. Such ribozymes are equivalent to the ribozymes described specifically in the Tables.

Optimizing Ribozyme Activity

Ribozyme activity can be optimized as described by Stinchcomb *et al.*, supra. The details will not be repeated here, but include altering the length of the ribozyme binding arms (stems I and III, see Figure 2c), or chemically synthesizing ribozymes with modifications that prevent their degradation by serum ribonucleases (see *e.g.*, Eckstein *et al.*, International Publication No. WO 92/07065; Perrault *et al.*, 1990 *Nature* 344, 565; Pieken *et al.*, 1991 *Science* 253, 314; Usman and Cedergren, 1992 *Trends in Biochem. Sci.* 17, 334; Usman *et al.*, International Publication No. WO 93/15187; Rossi *et al.*, International Publication No. WO 91/03162; Beigelman et al., 1995 *J. Biol Chem.* in press; as well as Sproat, US Patent No. 5,334,711 which describe various chemical modifications that can be made to the sugar moieties of enzymatic RNA molecules). Modifications which enhance their efficacy in cells, and removal of stem II bases to shorten RNA synthesis times and reduce chemical requirements are desired. (All these publications are hereby incorporated by reference herein).

Sullivan, *et al.*, *supra*, describes the general methods for delivery of enzymatic RNA molecules. Ribozymes may be administered to cells by a variety of methods known to those familiar to the art, including, but not restricted to, encapsulation in liposomes, by iontophoresis, or by incorporation into other vehicles, such as hydrogels, cyclodextrins, biodegradable nanocapsules, and bioadhesive microspheres. For some indications, ribozymes may be directly delivered *ex vivo* to cells or tissues with or without the aforementioned vehicles. Alternatively, the RNA/vehicle combination is locally delivered by direct injection or by use of a catheter, infusion pump or stent. Other routes of delivery include, but are not limited to, intravascular, intramuscular, subcutaneous or joint injection, aerosol inhalation, oral (tablet or pill form), topical, systemic, ocular, intraperitoneal and/or intra-

thecal delivery. More detailed descriptions of ribozyme delivery and administration are provided in Sullivan *et al.*, supra and Draper *et al.*, *supra* which have been incorporated by reference herein.

Another means of accumulating high concentrations of a ribozyme(s) within cells is to incorporate the ribozyme-encoding sequences into a DNA or RNA expression vector. Transcription of the ribozyme sequences are driven from a promoter for eukaryotic RNA polymerase I (pol I), RNA polymerase II (pol II), or RNA polymerase III (pol III). Transcripts from pol II or pol III promoters will be expressed at high levels in all cells; the levels of a given pol II promoter in a given cell type will depend on the nature of the gene regulatory sequences (enhancers, silencers, *etc.*) present nearby. Prokaryotic RNA polymerase promoters are also used, providing that the prokaryotic RNA polymerase enzyme is expressed in the appropriate cells (Elroy-Stein and Moss, 1990 *Proc. Natl. Acad. Sci. U S A*, 87, 6743-7; Gao and Huang 1993 *Nucleic Acids Res.*, 21, 2867-72; Lieber *et al.*, 1993 *Methods Enzymol.*, 217, 47-66; Zhou *et al.*, 1990 *Mol. Cell. Biol.*, 10, 4529-37; Thompson *et al.*, 1995 *supra*). Several investigators have demonstrated that ribozymes expressed from such promoters can function in mammalian cells (*e.g.* Kashani-Sabet *et al.*, 1992 *Antisense Res. Dev.*, 2, 3-15; Ojwang *et al.*, 1992 *Proc. Natl. Acad. Sci. U S A*, 89, 10802-6; Chen *et al.*, 1992 *Nucleic Acids Res.*, 20, 4581-9; Yu *et al.*, 1993 *Proc. Natl. Acad. Sci. U S A*, 90, 6340-4; L'Huillier *et al.*, 1992 *EMBO J.* 11, 4411-8; Lisziewicz *et al.*, 1993 *Proc. Natl. Acad. Sci. U. S. A.*, 90, 8000-4; Thompson et al., 1995 *Nucleic Acids Res.* 23, 2259). The above ribozyme transcription units can be incorporated into a variety of vectors for introduction into mammalian cells, including but not restricted to, plasmid DNA vectors, viral DNA vectors (such as adenovirus or adeno-associated virus vectors), or viral RNA vectors (such as retroviral or alphavirus vectors).

In a preferred embodiment of the invention, a transcription unit expressing a ribozyme that cleaves RNAs that encode flt-1, KDR and/or flk-1 are inserted into a plasmid DNA vector or an adenovirus or adeno-associated virus DNA viral vector or a retroviral RNA vector. Viral vectors have been used to transfer genes and lead to either transient or long term gene expression (Zabner *et al.*, 1993 Cell 75, 207; Carter, 1992 Curr. Opi. Biotech. 3, 533). The adenovirus, AAV or retroviral vector is delivered as recombinant viral particles. The DNA may be delivered alone or complexed with vehicles (as described for RNA above). The recombinant adenovirus or AAV or retroviral particles are locally administered to the site of treatment, e.g., through incubation or inhalation *in vivo* or by direct application to cells or tissues *ex vivo*. Retroviral vectors have also been used to express ribozymes in mammalian cells (Ojwang *et al.*, 1992 *supra;* Thompson *et al.*, 1995 *supra*).

flt-1, KDR and/or flk-1 are attractive nucleic acid-based therapeutic targets by several criteria. The interaction between VEGF and VEGF-R is well-established. Efficacy can be tested in well-defined and predictive animal models. Finally, the disease conditions are serious and current therapies are inadequate. Whereas protein-based therapies would inhibit VEGF activity nucleic acid-based therapy provides a direct and elegant approach to directly modulate flt-1, KDR and/or flk-1 expression.

Because flt-1 and KDR mRNAs are highly homologous in certain regions, some ribozyme target sites are also homologous (see Table X). In this case, a single ribozyme will target both flt-1 and KDR mRNAs. At partially homologous sites, a single ribozyme can sometimes be designed to accomodate a site on both mRNAs by including G/U basepairing. For example, if there is a G present in a ribozyme target site in KDR mRNA at the same position there is an A in the flt-1 ribozyme target site, the

ribozyme can be synthesized with a U at the complementary position and it will bind both to sites. The advantage of one ribozyme that targets both VEGF-R mRNAs is clear, especially in cases where both VEGF receptors may contribute to the progression of angiogenesis in the disease state.

"Angiogenesis" refers to formation of new blood vessels which is an essential process in reproduction, development and wound repair. "Tumor angiogenesis" refers to the induction of the growth of blood vessels from surrounding tissue into a solid tumor. Tumor growth and tumor metastasis are dependent on angiogenesis (for a review see Folkman, 1985 *supra*; Folkman 1990 *J. Natl. Cancer Inst.*, 82, 4; Folkman and Shing, 1992 *J. Biol. Chem.* 267, 10931).

Angiogenesis plays an important role in other diseases such as arthritis wherein new blood vessels have been shown to invade the joints and degrade cartilage (Folkman and Shing, *supra*).

"Retinopathy" refers to inflammation of the retina and/or degenerative condition of the retina which may lead to occlusion of the retina and eventual blindness. In "diabetic retinopathy" angiogenesis causes the capillaries in the retina to invade the vitreous resulting in bleeding and blindness which is also seen in neonatal retinopathy (for a review see Folkman, 1985 *supra*; Folkman 1990 *supra*; Folkman and Shing, 1992 *supra*).

Example 1: flt-1, KDR and/or flk-1 ribozymes

By engineering ribozyme motifs applicant has designed several ribozymes directed against flt-1, KDR and/or flk-1 encoded mRNA sequences. These ribozymes were synthesized with modifications that improve their nuclease resistance (Beigelman *et al.*, 1995 *J Biol. Chem.* 270, 25702) and enhance their activity in cells. The ability of ribozymes to cleave target sequences *in vitro* was evaluated essentially as described in Thompson *et al.*, PCT Publication

No. WO 93/23057; Draper *et al.*, PCT Publication No. WO 95/04818.

Example 2: Effect of ribozymes on the binding of VEGF to flt-1, KDR and/or flk-1 receptors

Several common human cell lines are available that express endogenous flt-1, KDR and/or flk-1. flt-1, KDR and/or flk-1 can be detected easily with monoclonal antibodies. Use of appropriate fluorescent reagents and fluorescence-activated cell-sorting (FACS) will permit direct quantitation of surface flt-1, KDR and/or flk-1 on a cell-by-cell basis. Active ribozymes are expected to directly reduce flt-1, KDR and/or flk-1 expression and thereby reduce VEGF binding to the cells. In this example, human umbelical cord microvascular endothelial cells were used.

Cell Preparation:

Plates are coated with 1.5% gelatin and allowed to stand for one hour. Cells (e.g., microvascular endothelial cells derived from human umbilical cord vein) are plated at 20,000 cells/well (24 well plate) in 200 ml growth media and incubated overnight (~ 1 doubling) to yield ~40,000 cells (75-80% confluent).

Ribozyme treatment:

Media is removed from cells and the cells are washed two times with 300 ml 1X PBS: Ca^{2+}: Mg^{2+} mixture. A complex of 200-500 nM ribozyme and LipofectAMINE® (3:1 lipid: phosphate ratio) in 200 ml OptiMEM® (5% FBS) was added to the cells. The cells are incubated for 6 hr (equivalent to 2-3 VEGF-R turnovers).

^{125}I VEGF binding assay:

The assay is carried out on ice to inhibit internalization of VEGF during the experiment. The media containing the ribozyme is removed from the cells and the cells

are washed twice with with 300 ml 1X PBS: Ca^{2+}: Mg^{2+} mixture containing 1% BSA. Appropriate ^{125}I VEGF solution (100,000 cpm/well, +/- 10 X cold 1X PBS, 1% BSA) was applied to the cells. The cells are incubated on ice for 1 h. ^{125}I VEGF-containing solution is removed and the cells are washed three times with with 300 ml 1X PBS: Ca^{2+}: Mg^{2+} mixture containing 1% BSA. To each well 300 ml of 100 mM Tris-HCl, pH 8.0, 0.5% Triton X-100 was added and the the mixture was incubated for 2 min. The ^{125}I VEGF-binding was quantitated using standard scintillation counting techniques. Percent inhibition was calculated as follows:

$$\text{Percent Inhibition} = \frac{\text{cpm } ^{125}\text{I VEGF bound by the ribozyme-treated samples}}{\text{cpm } ^{125}\text{I VEGF bound by the Control sample}} \times 100$$

Example 3: Effect of hammerhead ribozymes targeted against flt-1 receptor on the binding of VEGF

Hammerhead ribozymes targeted to twenty sites within flt-1 RNA were synthesized as described above. Sequence of the ribozymes used are shown in Table II; the length of stem II region is 3 bp. The hammerhead ribozymes were chemically modified such that the ribozyme consists of ribose residues at five positions; U4 and U7 positions contain 2'-NH_2 modifications, the remaining nucleotide positions contain 2'-O-methyl substitutions; four nucleotides at the 5' terminus contains phosphorothioate substitutions. Additionally, 3' end of the ribozyme contains a 3'-3' linked inverted abasic ribose.

Referring to Figure 7, the effect of hammerhead ribozymes targeted against flt-1 receptor on the binding of VEGF to flt-1 on the surface of human microvascular endothelial cells is shown. The majority of the ribozymes tested were able to inhibit the expression of flt-1 and thereby were able to inhibit the binding of VEGF.

In order to determine the specificity of ribozymes targeted against flt-1 RNA, the effect of five anti-flt-1 ribozymes on the binding of VEGF, UPA (urokinase plasmino-

gen activator) and FGF (fibroblast growth factor) to their corresponding receptors were assayed. As shown in Figure 9, there was significant inhibition of VEGF binding to its receptors on cells treated with anti-flt-1 ribozymes. There was no specific inhibition of the binding of UPA and FGF to their corresponding receptors. These data strongly suggest that anti-flt-1 ribozymes specifically cleave flt-1 RNA and not RNAs encoding the receptors for UPA and FGF, resulting in the inhibition of flt-1 receptor expression on the surface of the cells. Thus the ribozymes are responsible for the inhibition of VEGF binding but not the binding of UPA and FGF.

Example 4: Effect of hammerhead ribozymes targeted against KDR receptor on the binding of VEGF

Hammerhead ribozymes targeted to twenty one sites within KDR RNA were synthesized as described above. Sequence of the ribozymes used are shown in Table IV; the length of stem II region is 3 bp. The hammerhead ribozymes were chemically modified such that the ribozyme consists of ribose residues at five positions; U4 and U7 positions contain 2'-NH_2 modifications, the remaining nucleotide positions contain 2'-O-methyl substitutions; four nucleotides at the 5' terminus contains phosphorothioate substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose.

Referring to Figure 8, the effect of hammerhead ribozymes targeted against KDR receptor on the binding of VEGF to KDR on the surface of human microvascular endothelial cells is shown. A majority of the ribozymes tested were able to inhibit the expression of KDR and thereby were able to inhibit the binding of VEGF. As a control, the cells were treated with a ribozyme that is not targeted towards KDR RNA (irrel. RZ); there was no specific inhibition of VEGF binding. The results from this control experiment strongly suggest that the inhibi-

tion of VEGF binding observed with anti-KDR ribozymes is a ribozyme-mediated inhibition.

Example 5: Effect of ribozymes targeted against VEGF receptors on cell proliferation

Cell Preparation:

24-well plates are coated with 1.5% gelatin (porcine skin 300 bloom). After 1 hr, excess gelatin is washed off of the plate. Microvascular endothelial cells are plated at 5,000 cells/well (24 well plate) in 200 ml growth media. The cells are allowed to grow for ~ 18 hr (~ 1 doubling) to yield ~10,000 cells (25-30% confluent).

Ribozyme treatment:

Media is removed from the cells, and the cells are washed two times with 300 ml 1X PBS: Ca^{2+}: Mg^{2+} mixture.

For anti-flt-1 HH ribozyme experiment (Figure 12) a complex of 500 nM ribozyme; 15 mM LFA (3:1 lipid:phosphate ratio) in 200 ml OptiMEM (5% FCS) media was added to the cells. Incubation of cells is carried out for 6 hr (equivalent to 2-3 VEGF receptor turnovers).

For anti-KDR HH ribozyme experiment (Figure 13) a complex of 200 nM ribozyme; 5.25 mM LFA (3:1 lipid: phosphate ratio) in 200 ml OptiMEM (5% FCS) media was added to the cells. Incubation of cells is carried out for 3 hr.

Proliferation:

After three or six hours, the media is removed from the cells and the cells are washed with 300 ml 1X PBS: Ca^{2+}: Mg^{2+} mixture. Maintenance media (contains dialyzed 10% FBS) +/- VEGF or basic FGF at 10 ng/ml is added to the cells. The cells are incubated for 48 or 72 h. The cells are trypsinized and counted (Coulter counter). Trypan blue is added on one well of each treatment as control.

As shown in Figure 12B, VEGF and basic FGF can stimulate human microvascular endothelial cell proliferation. However, treatment of cells with 1358 HH or 4229 HH ribozymes, targeted against flt-1 mRNA, results in a significant decrease in the ability of VEGF to stimulate endothelial cell proliferation. These ribozymes do not inhibit the FGF-mediated stimulation of endothelial cell proliferation.

Human microvascular endothalial cells were also treated with hammerhead ribozymes targeted against sites 527, 730, 3702 or 3950 within the KDR mRNA. As shown in Figure 13, all four ribozymes caused significant inhibition of VEGF-mediated induction of cell proliferation. No significant inhibition of cell proliferation was observed when the cells were treated with a hammerhead ribozyme targeted to an irrelevant RNA. Additionally, none of the ribozymes inhibited FGF-mediated stimulation of cell proliferation.

These results strongly suggest that hammerhead ribozymes targeted against either flt-1 or KDR mRNA can specifically inhibit VEGF-mediated induction of endothelial cell proliferation.

<u>Example 6: Effect of antisense oligonucleotides targeted against VEGF receptors on cell proliferation (colorimetric assay)</u>

Following are some of the reagents used in the proliferation assay:

<u>Cells:</u> Human aortic endothelial cells (HAEC) from Clonetics®. Cells at early passage are preferably used.

<u>Uptake Medium:</u> EBM (from Clonetics®);1% L-Glutamine;20 mM Hepes; No serum; No antibiotics.

<u>Growth Medium:</u> EGM (from Clonetics®);FBS to 20%;1% L-Glutamine;20 mM Hepes.

<u>Cell Plating</u>: 96-well tissue culture plates are coated with 0.2% gelatin (50 ml/well). The gelatin is incubated in the wells at room temperature for 15-30

minutes. The gelatin is removed by aspiration and the wells are washed with PBS:Ca^{2+}: Mg^{2+} mixture. PBS mixture is left in the wells until cells are ready to be added. HAEC cells were detached by trypsin treatment and resuspended at 1.25 x 10^4/ml in growth medium. PBS is removed from plates and 200 ml of cells (i.e. 2.5 x 10^3 cells/well) are added to each well. The cells are allowed to grow for 48 hours before the proliferation assay.

Assay: Growth medium is removed from the wells. The cells are washed twice with PBS:Ca^{2+}: Mg^{2+} mixture without antibiotics. A formulation of lipid/antisense oligonucleotide (antisense oligonucleotide is used here as a non-limiting example) complex is added to each well (100 ml/well) in uptake medium. The cells are incubated for 2-3 hours at 37°C in CO_2 incubator. After uptake, 100 ml/well of growth medium is added (gives final FBS concentration of 10%). After approximately 72 hours, 40 ml MTS® stock solution (made as described by manufacturer) was added to each well and incubated at 37°C for 1-3 hours, depending on the color development. (For this assay, 2 hours was sufficient). The intensity of color formation was determined on a plate reader at 490 nM.

Phosphorothioate-substituted antisense oligodeoxynucleotides were custom synthesized by The Midland Certified Reagent Company®, Midland, Texas. Following non-limiting antisense oligodeoxynucleotides targeted against KDR RNA were used in the proliferation assay:

KDR 21 AS: 5'-GCA GCA CCT TGC TCT CCA TCC-3'

SCRAMBLED CONTROL: 5'-CTG CCA ACT TCC CAT GCC TGC-3'

As shown in Figure 10, proliferation of HAEC cells are specifically inhibited by increasing concentrations of the phosphorothioate anti-KDR-antisense oligodeoxynucleotide. The scrambled antisense oligonucleotide is not expected to bind the KDR RNA and therefore is not expected to inhibit KDR expression. As expected, there is no detectable inhibition of proliferation of HAEC cells

treated with a phosphorothioate antisense oligonucleotide with scrambled sequence.

Example 7: *In vitro* cleavage of flt-1 RNA by hammerhead ribozymes

Referring to Figure 11A, hammerhead ribozymes (HH) targeted against sites 1358 and 4229 within the flt-1 RNA were synthesized as described above.

RNA cleavage assay *in vitro*:

Substrate RNA was 5' end-labeled using [g-^{32}P] ATP and T4 polynucleotide kinase (US Biochemicals). Cleavage reactions were carried out under ribozyme "excess" conditions. Trace amount ($\leq$ 1 nM) of 5' end-labeled substrate and 40 nM unlabeled ribozyme were denatured and renatured separately by heating to 90°C for 2 min and snap-cooling on ice for 10-15 min. The ribozyme and substrate were incubated, separately, at 37°C for 10 min in a buffer containing 50 mM Tris-HCl and 10 mM $MgCl_2$. The reaction was initiated by mixing the ribozyme and substrate solutions and incubating at 37°C. Aliquots of 5 ml are taken at regular intervals of time and the reaction is quenched by mixing with equal volume of 2X formamide stop mix. The samples are resolved on 20 % denaturing polyacrylamide gels. The results were quantified and percentage of target RNA cleaved is plotted as a function of time.

Referring to Figure 11B and 11C, hammerhead ribozymes targeted against sites 1358 and 4229 within the flt-1 RNA are capable of cleaving target RNA efficiently *in vitro*.

Example 8: *In vitro* cleavage of KDR RNA by hammerhead ribozymes

In this non-limiting example, hammerhead ribozymes targeted against sites 726, 527, 3702 and 3950 within KDR RNA were synthesized as described above. RNA cleavage reactions were carried out *in vitro* essentially as described under Example 7.

Referring to Figures 14 and 15, all four ribozymes were able to cleave their cognate target RNA efficiently in a sequence-specific manner.

Example 9: *In vitro* cleavage of RNA by hammerhead ribozymes targeted against cleavage sites that are homologous between KDR and flt-1 mRNA

Because flt-1 and KDR mRNAs are highly homologous in certain regions, some ribozyme target sites are also homologous (see Table X). In this case, a single ribozyme will target both flt-1 and KDR mRNAs. Hammerhead ribozyme (FLT/KDR-I) targeted against one of the homologous sites between flt-1 and KDR (flt-1 site 3388 and KDR site 3151) was synthesized as described above. Ribozymes with either a 3 bp stem II or a 4 bp stem II were synthesized. RNA cleavage reactions were carried out *in vitro* essentially as described under Example 7.

Referring to Figure 16, FLT/KDR-I ribozyme with either a 3 or a 4 bp stem II was able to cleave its target RNA efficiently *in vitro*.

Example 10: Effect of multiple ribozymes targeted against both flt-1 and KDR RNA on cell proliferation

Since both flt-1 and KDR receptors of VEGF are involved in angiogenesis, the inhibition of the expression of both of these genes may be an effective approach to inhibit angiogenesis.

Human microvascular endothalial cells were treated with hammerhead ribozymes targeted against sites flt-1 4229 alone, KDR 527 alone, KDR 726 alone, KDR 3950 alone, flt-1 4229 + KDR 527, flt-1 4229 + KDR 726 or flt-1 4229 + KDR 3950. As shown in Figure 17, all the combinations of active ribozymes (A) caused significant inhibition of VEGF-mediated induction of cell proliferation. No significant inhibition of cell proliferation was observed when the cells were treated with a catalytically inactive (I) hammerhead ribozymes. Additionally, cells treated

with ribozymes targeted against both flt-1 and KDR RNAs-flt-1 4229 + KDR 527; flt-1 4229 + KDR 726; flt-1 4229 + KDR 3950, were able to cause a greater inhibition of VEGF-mediated induction of cell proliferation when compared with individual ribozymes targeted against either flt-1 or KDR RNA (see flt-1 4229 alone; KDR 527 alone; KDR 726 alone; KDR 3950 alone). This strongly suggests that treatment of cells with multiple ribozymes may be a more effective means of inhibition of gene expression.

Animal Models

There are several animal models in which the anti-angiogenesis effect of nucleic acids of the present invention, such as ribozymes, directed against VEGF-R mRNAs can be tested. Typically a corneal model has been used to study angiogenesis in rat and rabbit since recruitment of vessels can easily be followed in this normally avascular tissue (Pandey *et al.*, 1995 *Science* 268: 567-569). In these models, a small Teflon or Hydron disk pretreated with an angiogenesis factor (e.g. bFGF or VEGF) is inserted into a pocket surgically created in the cornea. Angiogenesis is monitored 3 to 5 days later. Ribozymes directed against VEGF-R mRNAs would be delivered in the disk as well, or dropwise to the eye over the time course of the experiment. In another eye model, hypoxia has been shown to cause both increased expression of VEGF and neovascularization in the retina (Pierce *et al.*, 1995 *Proc. Natl. Acad. Sci.* USA. 92: 905-909; Shweiki *et al.*, 1992 *J. Clin. Invest.* 91: 2235-2243).

In human glioblastomas, it has been shown that VEGF is at least partially responsible for tumor angiogenesis (Plate *et al.*, 1992 *Nature* 359, 845). Animal models have been developed in which glioblastoma cells are implanted subcutaneously into nude mice and the progress of tumor growth and angiogenesism is studied (Kim *et al.*, 1993 *supra*; Millauer *et al.*, 1994 *supra*).

Another animal model that addresses neovascularization involves Matrigel, an extract of basement membrane that becomes a solid gel when injected subcutaneously (Passaniti *et al.*, 1992 *Lab. Invest.* 67: 519-528). When the Matrigel is supplemented with angiogenesis factors such as VEGF, vessels grow into the Matrigel over a period of 3 to 5 days and angiogenesis can be assessed. Again, ribozymes directed against VEGF-R mRNAs would be delivered in the Matrigel.

Several animal models exist for screening of anti-angiogenic agents. These include corneal vessel formation following corneal injury (Burger *et al.*, 1985 *Cornea* 4: 35-41; Lepri, *et al.*, 1994 *J. Ocular Pharmacol.* 10: 273-280; Ormerod *et al.*, 1990 *Am. J. Pathol.* 137: 1243-1252) or intracorneal growth factor implant (Grant *et al.*, 1993 *Diabetologia* 36: 282-291; Pandey *et al.* 1995 *supra;* Zieche *et al.*, 1992 *Lab. Invest.* 67: 711-715), vessel growth into Matrigel matrix containing growth factors (Passaniti *et al.*, 1992 *supra*), female reproductive organ neovascularization following hormonal manipulation (Shweiki *et al.*, 1993 *Clin. Invest.* 91: 2235-2243), several models involving inhibition of tumor growth in highly vascularized solid tumors (O'Reilly *et al.*, 1994 *Cell* 79: 315-328; Senger *et al.*, 1993 *Cancer and Metas. Rev.* 12: 303-324; Takahasi *et al.*, 1994 *Cancer Res.* 54: 4233-4237; Kim *et al.*, 1993 *supra*), and transient hypoxia-induced neovascularization in the mouse retina (Pierce *et al.*, 1995 *Proc. Natl. Acad. Sci.* USA. 92: 905-909).

The cornea model, described in Pandey et al. *supra*, is the most common and well characterized anti-angiogenic agent efficacy screening model. This model involves an avascular tissue into which vessels are recruited by a stimulating agent (growth factor, thermal or alkalai burn, endotoxin). The corneal model would utilize the intrastromal corneal implantation of a Teflon pellet soaked in a VEGF-Hydron solution to recruit blood vessels toward the pellet which can be quantitated using standard microscopic

and image analysis techniques. To evaluate their anti-angiogenic efficacy, ribozymes are applied topically to the eye or bound within Hydron on the Teflon pellet itself. This avascular cornea as well as the Matrigel (see below) provide for low background assays. While the corneal model has been performed extensively in the rabbit, studies in the rat have also been conducted.

The mouse model (Passaniti et al., *supra*) is a non-tissue model which utilizes Matrigel, an extract of basement membrane (Kleinman et al., 1986) or Millipore® filter disk, which can be impregnated with growth factors and anti-angiogenic agents in a liquid form prior to injection. Upon subcutaneous administration at body temperature, the Matrigel or Millipore® filter disk forms a solid implant. VEGF embedded in the Matrigel or Millipore® filter disk would be used to recruit vessels within the matrix of the Matrigel or Millipore® filter disk which can be processed histologically for endothelial cell specific vWF (factor VIII antigen) immunohistochemistry, Trichrome-Masson stain, or hemoglobin content. Like the cornea, the Matrigel or Millipore® filter disk are avascular; however, it is not tissue. In the Matrigel or Millipore® filter disk model, ribozymes are administered within the matrix of the Matrigel or Millipore® filter disk to test their anti-angiogenic efficacy. Thus, delivery issues in this model, as with delivery of ribozymes by Hydron-coated Teflon pellets in the rat cornea model, may be less problematic due to the homogeneous presence of the ribozyme within the respective matrix.

These models offer a distinct advantage over several other angiogenic models listed previously. The ability to use VEGF as a pro-angiogenic stimulus in both models is highly desirable since ribozymes will target only VEGFr mRNA. In other words, the involvement of other non-specific types of stimuli in the cornea and Matrigel models is not advantageous from the standpoint of understanding the pharmacologic mechanism by which the

anti-VEGFr mRNA ribozymes produce their effects. In addition, the models will allow for testing the specificity of the anti-VEGFr mRNA ribozymes by using either a- or bFGF as a pro-angiogenic factor. Vessel recruitment using FGF should not be affected in either model by anti-VEGFr mRNA ribozymes. Other models of angiogenesis including vessel formation in the female reproductive system using hormonal manipulation (Shweiki *et al.*, 1993 *supra*); a variety of vascular solid tumor models which involve indirect correlations with angiogenesis (O'Reilly *et al.*, 1994 *supra*; Senger *et al.*, 1993 *supra*; Takahasi *et al.*, 1994 *supra*; Kim *et al.*, 1993 *supra*); and retinal neovascularization following transient hypoxia (Pierce *et al.*, 1995 *supra*) were not selected for efficacy screening due to their non-specific nature, although there is a correlation between VEGF and angiogenesis in these models.

Other model systems to study tumor angiogenesis is reviewed by Folkman, 1985 *Adv. Cancer. Res.*. 43, 175.

flt-1, KDR and/or flk-1 protein levels can be measured clinically or experimentally by FACS analysis. flt-1, KDR and/or flk-1 encoded mRNA levels will be assessed by Northern analysis, RNase-protection, primer extension analysis and/or quantitative RT-PCR. Ribozymes that block flt-1, KDR and/or flk-1 protein encoding mRNAs and therefore result in decreased levels of flt-1, KDR and/or flk-1 activity by more than 20% *in vitro* will be identified.

Ribozymes and/or genes encoding them are delivered by either free delivery, liposome delivery, cationic lipid delivery, adeno-associated virus vector delivery, adenovirus vector delivery, retrovirus vector delivery or plasmid vector delivery in these animal model experiments (see above).

Patients can be treated by locally administering nucleic acids targeted against VEGF-R by direct injection. Routes of administration may include, but are not limited to, intravascular, intramuscular, subcutaneous, intra-

articular, aerosol inhalation, oral (tablet, capsule or pill form), topical, systemic, ocular, intraperitoneal and/or intrathecal delivery.

Example 11: Ribozyme-mediated inhibition of angiogenesis *in vivo*

The purpose ot this study was to assess the anti-angiogenic activity of hammerhead ribozymes targeted against flt-1 4229 site in the rat cornea model of VEGF induced angiogenesis (see above). These ribozymes have either active or inactive catalytic core and either bind and cleave or just bind to VEGF-R mRNA of the flt-1 subtype. The active ribozymes, that are able to bind and cleave the target RNA, have been shown to inhibit (^{125}I-labeled) VEGF binding in cultured endothelial cells and produce a dose-dependent decrease in VEGF induced endothelial cell proliferation in these cells (see Examples 3-5 above). The catalytically inactive forms of these ribozymes, wherein the ribozymes can only bind to the RNA but cannot catalyze RNA cleavage, fail to show these characteristics. The ribozymes and VEGF were co-delivered using the filter disk method: Nitrocellulose filter disks (Millipore®) of 0.057 diameter were immersed in appropriate solutions and were surgically implanted in rat cornea as described by Pandey *et al.*, *supra*. This delivery method has been shown to deliver rhodamine-labeled free ribozyme to scleral cells and, in all likelihood cells of the pericorneal vascular plexus. Since the active ribozymes show cell culture efficacy and can be delivered to the target site using the disk method, it is essential that these ribozymes be assessed for *in vivo* anti-angiogenic activity.

The stimulus for angiogenesis in this study was the treatment of the filter disk with 30 mM VEGF which is implanted within the cornea's stroma. This dose yields reproducible neovascularization stemming from the peri-corneal vascular plexus growing toward the disk in a

dose-response study 5 days following implant. Filter disks treated only with the vehicle for VEGF show no angiogenic response. The ribozymes was co-adminstered with VEGF on a disk in two different ribozyme concentrations. One concern with the simultaneous administration is that the ribozymes will not be able to inhibit angiogenesis since VEGF receptors can be stimulated. However, we have observed that in low VEGF doses, the neovascular response reverts to normal suggesting that the VEGF stimulus is essential for maintaining the angiogenic response. Blocking the production of VEGF receptors using simultaneous administration of anti-VEGF-R mRNA ribozymes could attenuate the normal neovascularization induced by the filter disk treated with VEGF.

Materials and Methods:

1. Stock hammerhead ribozyme solutions:
   a. flt-1 4229 (786 μM) - Active
   b. flt-1 4229 (736 μM) - Inactive

2. Experimantal solutions/groups:

Group 1	Solution 1	Control VEGF solution: 30 μM in 82mM Tris base
Group 2	Solution 2	flt-1 4229 (1 μg/μL) in 30 μM VEGF/82 mM Tris base
Group 3	Solution 3	flt-1 4229 (10 μg/μL) in 30 μM VEGF/82 mM Tris base
Group 4	Solution 4	No VEGF, flt-1 4229 (10 μg/μL) in 82 mM Tris base
Group 5	Solution 5	No VEGF, No ribozyme in 82 mM Tris base

10 eyes per group, 5 animals (Since they have similar molecular weights, the molar concentrations should be essentially similar).

Each solution (VEGF and RIBOZYMES) were prepared as a 2X solution for 1:1 mixing for final concentrations

above, with the exception of solution 1 in which VEGF was 2X and diluted with ribozyme diluent (sterile water).

3. VEGF Solutions

The 2X VEGF solution (60 μM) was prepared from a stock of 0.82 μg/μL in 50 mM Tris base. 200 μL of VEGF stock was concentrated by speed vac to a final volume of 60.8 μL, for a final concentration of 2.7 μg/μL or 60 μM. Six 10 μL aliquots was prepared for daily mixing. 2X solutions for VEGF and Ribozyme was stored at 4°C until the day of the surgery. Solutions were mixed for each day of surgery. Original 2X solutions was prepared on the day before the first day of the surgery.

4. Surgical Solutions:

Anesthesia:

stock ketamine hydrochloride 100 mg/mL
stock xylazine hydrochloride 20 mg/mL
stock acepromazine 10 mg/mL

Final anesthesia solution: 50 mg/mL ketamine, 10 mg/mL xylazine, and 0.5 mg/mL acepromazine

5% povidone iodine for opthalmic surgical wash
2% lidocaine (sterile) for opthalmic administration (2 drops per eye)
sterile 0.9% NaCl for opthalmic irrigation

5. Surgical Methods:

Standard surgical procedure as described in Pandey *et al.*, *supra*. Filter disks were incubated in 1 μL of each solution for approximately 30 minutes prior to implantation.

5. Experimental Protocol:

The animal cornea were treated with the treatment groups as described above. Animals were allowed to recover for 5 days after treatment with daily observation (scoring 0 - 3). On the fifth day animals were euthanized and

digital images of each eye was obtained for quantitaion using Image Pro Plus. Quantitated neovascular surface area were analyzed by ANOVA followed by two post-hoc tests including Dunnets and Tukey-Kramer tests for significance at the 95% confidence level. Dunnets provide information on the significance between the differences within the means of treatments vs. controls while Tukey-Kramer provide information on the significance of differences within the means of each group.

Results are graphically represented in Figure 18. As shown in the figure, flt-1 4229 active hammerhead ribozyme at both concentrations was effective at inhibiting angiogenesis while the inactive ribozyme did not show any significant reduction in angiogenesis. A statistically signifiant reduction in neovascular surface area was observed only with active ribozymes. This result clearly shows that the ribozymes are capable of significantly inhibiting angiogenesis *in vivo*. Specifically, the mechanism of inhibition appears to be by the binding and cleavage of target RNA by ribozymes.

Diagnostic uses

Ribozymes of this invention may be used as diagnostic tools to examine genetic drift and mutations within diseased cells or to detect the presence of flt-1, KDR and/or flk-1 RNA in a cell. The close relationship between ribozyme activity and the structure of the target RNA allows the detection of mutations in any region of the molecule which alters the base-pairing and three-dimensional structure of the target RNA. By using multiple ribozymes described in this invention, one may map nucleotide changes which are important to RNA structure and function *in vitro*, as well as in cells and tissues. Cleavage of target RNAs with ribozymes may be used to inhibit gene expression and define the role (essentially) of specified gene products in the progression of disease. In this manner, other genetic targets

may be defined as important mediators of the disease. These experiments will lead to better treatment of the disease progression by affording the possibility of combinational therapies (*e.g.*, multiple ribozymes targeted to different genes, ribozymes coupled with known small molecule inhibitors, or intermittent treatment with combinations of ribozymes and/or other chemical or biological molecules). Other *in vitro* uses of ribozymes of this invention are well known in the art, and include detection of the presence of mRNAs associated with flt-1, KDR and/or flk-1 related condition. Such RNA is detected by determining the presence of a cleavage product after treatment with a ribozyme using standard methodology.

In a specific example, ribozymes which can cleave only wild-type or mutant forms of the target RNA are used for the assay. The first ribozyme is used to identify wild-type RNA present in the sample and the second ribozyme will be used to identify mutant RNA in the sample. As reaction controls, synthetic substrates of both wild-type and mutant RNA will be cleaved by both ribozymes to demonstrate the relative ribozyme efficiencies in the reactions and the absence of cleavage of the "non-targeted" RNA species. The cleavage products from the synthetic substrates will also serve to generate size markers for the analysis of wild-type and mutant RNAs in the sample population. Thus each analysis will require two ribozymes, two substrates and one unknown sample which will be combined into six reactions. The presence of cleavage products will be determined using an RNAse protection assay so that full-length and cleavage fragments of each RNA can be analyzed in one lane of a polyacrylamide gel. It is not absolutely required to quantify the results to gain insight into the expression of mutant RNAs and putative risk of the desired phenotypic changes in target cells. The expression of mRNA whose protein product is implicated in the development of the phenotype (i.e., flt-1, KDR and/or flk-1) is adequate to establish

risk. If probes of comparable specific activity are used for both transcripts, then a qualitative comparison of RNA levels will be adequate and will decrease the cost of the initial diagnosis. Higher mutant form to wild-type ratios will be correlated with higher risk whether RNA levels are compared qualitatively or quantitatively.

Other embodiments are within the following claims.

Table I

Characteristics of Ribozymes

Group I Introns

Size: ~200 to >1000 nucleotides

Requires a U in the target sequence immediately 5' of the cleavage site.

Binds 4-6 nucleotides at 5' side of cleavage site.

Over 75 known members of this class. Found in *Tetrahymena thermophila* rRNA, fungal mitochondria, chloroplasts, phage T4, blue-green algae, and others.

RNAseP RNA (M1 RNA)

Size: ~290 to 400 nucleotides

RNA portion of a ribonucleoprotein enzyme. Cleaves tRNA precursors to form mature tRNA.

Roughly 10 known members of this group all are bacterial in origin.

Hammerhead Ribozyme

Size: ~13 to 40 nucleotides.

Requires the target sequence UH immediately 5' of the cleavage site.

Binds a variable number of nucleotides on both sides of the cleavage site.

14 known members of this class. Found in a number of plant pathogens (virusoids) that use RNA as the infectious agent (Figure 1 and 2)

Hairpin Ribozyme

Size: ~50 nucleotides.

Requires the target sequence GUC immediately 3' of the cleavage site.

Binds 4-6 nucleotides at 5' side of the cleavage site and a variable number to the 3' side of the cleavage site.

Only 3 known member of this class. Found in three plant pathogen (satellite RNAs of the tobacco ringspot virus,

arabis mosaic virus and chicory yellow mottle virus) which uses RNA as the infectious agent (Figure 3).

Hepatitis Delta Virus (HDV) Ribozyme

Size: 50-60 nucleotides (at present)

Sequence requirements not fully determined.

Binding sites and structural requirements not fully determined, although no sequences 5' of cleavage site are required.

Only 1 known member of this class. Found in human HDV (Figure 4).

Neurospora VS RNA Ribozyme

Size: ~144 nucleotides (at present)

Cleavage of target RNAs recently demonstrated.

Sequence requirements not fully determined.

Binding sites and structural requirements not fully determined. Only 1 known member of this class. Found in *Neurospora* VS RNA (Figure 5).

Table II: Human *flt1* VEGF Receptor-Hammerhead Ribozyme and Substrate Sequence

nt. Position	HH Ribozyme	Substrate
10	GCCGAGAG CUGAUGA X GAA AGUGUCCG	CGGACACUC CUCUCGGC
13	GGAGCCGA CUGAUGA X GAA AGGAGUGU	ACACUCCUC UCGGCUCC
15	GAGGAGCC CUGAUGA X GAA AGAGGAGU	ACUCCUCUC GGCUCCUC
20	CCGGGGAG CUGAUGA X GAA AGCCGAGA	UCUCGGCUC CUCCCCGG
23	CUGCCGGG CUGAUGA X GAA AGGAGCCG	CGGCUCCUC CCCGGCAG
43	CCCGCUCC CUGAUGA X GAA AGCCGCCG	CGGCGGCUC GGAGCGGG
54	GAGCCCCG CUGAUGA X GAA AGCCCGCU	AGCGGGCUC CGGGGCUC
62	CUGCACCC CUGAUGA X GAA AGCCCCGG	CCGGGGCUC GGGUGCAG
97	CCCCGGGU CUGAUGA X GAA AUCCUCGC	GCGAGGAUU ACCCGGGG
98	UCCCCGGG CUGAUGA X GAA AAUCCUCG	CGAGGAUUA CCCGGGGA

113	CAGGAGAC CUGAUGA X GAA ACCACUUC	GAAGUGGUU GUCUCCUG
116	AGCCAGGA CUGAUGA X GAA ACAACCAC	GUGGUUGUC UCCUGGCU
118	CCAGCCAG CUGAUGA X GAA AGACAACC	GGUUGUCUC CUGGCUGG
145	CGCGCCCU CUGAUGA X GAA AGCGCCCG	CGGGCGCUC AGGGCGCG
185	GGCCGCCA CUGAUGA X GAA AGUCCGUC	GACGGACUC UGGCGGCC
198	CGGCCAAC CUGAUGA X GAA ACCCGGCC	GGCCGGGUC GUUGGCCG
201	CCCCGGCC CUGAUGA X GAA ACGACCCG	CGGGUCGUU GGCCGGGG
240	GUGAGCGC CUGAUGA X GAA ACGCGGCC	GGCCGCGUC GCGCUCAC
246	ACCAUGGU CUGAUGA X GAA AGCGCGAC	GUCGCGCUC ACCAUGGU
255	CAGUAGCU CUGAUGA X GAA ACCAUGGU	ACCAUGGUC AGCUACUG
260	UGUCCCAG CUGAUGA X GAA AGCUGACC	GGUCAGCUA CUGGGACA
276	CACAGCAG CUGAUGA X GAA ACCCCGGU	ACCGGGGUC CUGCUGUG
294	AGACAGCU CUGAUGA X GAA AGCAGCGC	GCGCUGCUC AGCUGUCU
301	GAGAAGCA CUGAUGA X GAA ACAGCUGA	UCAGCUGUC UGCUUCUC
306	CCUGUGAG CUGAUGA X GAA AGCAGACA	UGUCUGCUU CUCACAGG
307	UCCUGUGA CUGAUGA X GAA AAGCAGAC	GUCUGCUUC UCACAGGA
309	GAUCCUGU CUGAUGA X GAA AGAAGCAG	CUGCUUCUC ACAGGAUC
317	CUGAACUA CUGAUGA X GAA AUCCUGUG	CACAGGAUC UAGUUCAG
319	ACCUGAAC CUGAUGA X GAA AGAUCCUG	CAGGAUCUA GUUCAGGU
322	UGAACCUG CUGAUGA X GAA ACUAGAUC	GAUCUAGUU CAGGUUCA
323	UUGAACCU CUGAUGA X GAA AACUAGAU	AUCUAGUUC AGGUUCAA
328	UAAUUUUG CUGAUGA X GAA ACCUGAAC	GUUCAGGUU CAAAAUUA
329	UUAAUUUU CUGAUGA X GAA AACCUGAA	UUCAGGUUC AAAAUUAA
335	GAUCUUUU CUGAUGA X GAA AUUUUGAA	UUCAAAAUU AAAAGAUC
336	GGAUCUUU CUGAUGA X GAA AAUUUUGA	UCAAAAUUA AAAGAUCC
343	CAGUUCAG CUGAUGA X GAA AUCUUUUA	UAAAAGAUC CUGAACUG
355	GCCUUUUA CUGAUGA X GAA ACUCAGUU	AACUGAGUU UAAAAGGC
356	UGCCUUUU CUGAUGA X GAA AACUCAGU	ACUGAGUUU AAAAGGCA
357	GUGCCUUU CUGAUGA X GAA AAACUCAG	CUGAGUUUA AAAGGCAC
375	GCUUGCAU CUGAUGA X GAA AUGUGCUG	CAGCACAUC AUGCAAGC
400	GCAUUGGA CUGAUGA X GAA AUGCAGUG	CACUGCAUC UCCAAUGC
402	CUGCAUUG CUGAUGA X GAA AGAUGCAG	CUGCAUCUC CAAUGCAG
427	AGACCAUU CUGAUGA X GAA AUGGGCUG	CAGCCCAUA AAUGGUCU

434	CAGGCAAA	CUGAUGA	X	GAA	ACCAUUUA	UAAAUGGUC UUUGCCUG
436	UUCAGGCA	CUGAUGA	X	GAA	AGACCAUU	AAUGGUCUU UGCCUGAA
437	UUUCAGGC	CUGAUGA	X	GAA	AAGACCAU	AUGGUCUUU GCCUGAAA
454	GCUUUCCU	CUGAUGA	X	GAA	ACUCACCA	UGGUGAGUA AGGAAAGC
477	GAUUUAGU	CUGAUGA	X	GAA	AUGCUCAG	CUGAGCAUA ACUAAAUC
481	GGCAGAUU	CUGAUGA	X	GAA	AGUUAUGC	GCAUAACUA AAUCUGCC
485	CACAGGCA	CUGAUGA	X	GAA	AUUUAGUU	AACUAAAUC UGCCUGUG
512	UACUGCAG	CUGAUGA	X	GAA	AUUGUUUG	CAAACAAUU CUGCAGUA
513	GUACUGCA	CUGAUGA	X	GAA	AAUUGUUU	AAACAAUUC UGCAGUAC
520	GGUUAAAG	CUGAUGA	X	GAA	ACUGCAGA	UCUGCAGUA CUUUAACC
523	CAAGGUUA	CUGAUGA	X	GAA	AGUACUGC	GCAGUACUU UAACCUUG
524	UCAAGGUU	CUGAUGA	X	GAA	AAGUACUG	CAGUACUUU AACCUUGA
525	UUCAAGGU	CUGAUGA	X	GAA	AAAGUACU	AGUACUUUA ACCUUGAA
530	CUGUGUUC	CUGAUGA	X	GAA	AGGUUAAA	UUUAACCUU GAACACAG
541	GUUUGCUU	CUGAUGA	X	GAA	AGCUGUGU	ACACAGCUC AAGCAAAC
560	AGCUGUAG	CUGAUGA	X	GAA	AGCCAGUG	CACUGGCUU CUACAGCU
561	CAGCUGUA	CUGAUGA	X	GAA	AAGCCAGU	ACUGGCUUC UACAGCUG
563	UGCAGCUG	CUGAUGA	X	GAA	AGAAGCCA	UGGCUUCUA CAGCUGCA
575	CAGCUAGA	CUGAUGA	X	GAA	AUUUGCAG	CUGCAAAUA UCUAGCUG
577	UACAGCUA	CUGAUGA	X	GAA	AUAUUUGC	GCAAAUAUC UAGCUGUA
579	GGUACAGC	CUGAUGA	X	GAA	AGAUAUUU	AAAUAUCUA GCUGUACC
585	GAAGUAGG	CUGAUGA	X	GAA	ACAGCUAG	CUAGCUGUA CCUACUUC
589	CUUUGAAG	CUGAUGA	X	GAA	AGGUACAG	CUGUACCUA CUUCAAAG
592	CUUCUUUG	CUGAUGA	X	GAA	AGUAGGUA	UACCUACUU CAAAGAAG
593	UCUUCUUU	CUGAUGA	X	GAA	AAGUAGGU	ACCUACUUC AAAGAAGA
614	AGAUUGCA	CUGAUGA	X	GAA	AUUCUGUU	AACAGAAUC UGCAAUCU
621	AAUAUAUA	CUGAUGA	X	GAA	AUUGCAGA	UCUGCAAUC UAUAUAUU
623	UAAAUAUA	CUGAUGA	X	GAA	AGAUUGCA	UGCAAUCUA UAUAUUUA
625	AAUAAAUA	CUGAUGA	X	GAA	AUAGAUUG	CAAUCUAUA UAUUUAUU
627	CUAAUAAA	CUGAUGA	X	GAA	AUAUAGAU	AUCUAUAUA UUUAUUAG
629	CACUAAUA	CUGAUGA	X	GAA	AUAUAUAG	CUAUAUAUU UAUUAGUG
630	UCACUAAU	CUGAUGA	X	GAA	AAUAUAUA	UAUAUAUUU AUUAGUGA
631	AUCACUAA	CUGAUGA	X	GAA	AAAUAUAU	AUAUAUUUA UUAGUGAU

633	GUAUCACU CUGAUGA X GAA AUAAAUAU	AUAUUUAUU AGUGAUAC
634	UGUAUCAC CUGAUGA X GAA AAUAAAUA	UAUUUAUUA GUGAUACA
640	UCUACCUG CUGAUGA X GAA AUCACUAA	UUAGUGAUA CAGGUAGA
646	GAAAGGUC CUGAUGA X GAA ACCUGUAU	AUACAGGUA GACCUUUC
652	CUCUACGA CUGAUGA X GAA AGGUCUAC	GUAGACCUU UCGUAGAG
653	UCUCUACG CUGAUGA X GAA AAGGUCUA	UAGACCUUU CGUAGAGA
654	AUCUCUAC CUGAUGA X GAA AAAGGUCU	AGACCUUUC GUAGAGAU
657	UACAUCUC CUGAUGA X GAA ACGAAAGG	CCUUUCGUA GAGAUGUA
665	UUUCACUG CUGAUGA X GAA ACAUCUCU	AGAGAUGUA CAGUGAAA
675	AUUUCGGG CUGAUGA X GAA AUUUCACU	AGUGAAAUC CCCGAAAU
684	AUGUGUAU CUGAUGA X GAA AUUUCGGG	CCCGAAAUU AUACACAU
685	CAUGUGUA CUGAUGA X GAA AAUUUCGG	CCGAAAUUA UACACAUG
687	GUCAUGUG CUGAUGA X GAA AUAAUUUC	GAAAUUAUA CACAUGAC
711	GGAAUGAC CUGAUGA X GAA AGCUCCCU	AGGGAGCUC GUCAUUCC
714	CAGGGAAU CUGAUGA X GAA ACGAGCUC	GAGCUCGUC AUUCCCUG
717	CGGCAGGG CUGAUGA X GAA AUGACGAG	CUCGUCAUU CCCUGCCG
718	CCGGCAGG CUGAUGA X GAA AAUGACGA	UCGUCAUUC CCUGCCGG
729	GGUGACGU CUGAUGA X GAA ACCCGGCA	UGCCGGGUU ACGUCACC
730	AGGUGACG CUGAUGA X GAA AACCCGGC	GCCGGGUUA CGUCACCU
734	UGUUAGGU CUGAUGA X GAA ACGUAACC	GGUUACGUC ACCUAACA
739	AGUGAUGU CUGAUGA X GAA AGGUGACG	CGUCACCUA ACAUCACU
744	GUAACAGU CUGAUGA X GAA AUGUUAGG	CCUAACAUC ACUGUUAC
750	UUUAAAGU CUGAUGA X GAA ACAGUGAU	AUCACUGUU ACUUUAAA
751	UUUUAAAG CUGAUGA X GAA AACAGUGA	UCACUGUUA CUUUAAAA
754	CUUUUUUA CUGAUGA X GAA AGUAACAG	CUGUUACUU UAAAAAAG
755	ACUUUUUU CUGAUGA X GAA AAGUAACA	UGUUACUUU AAAAAAGU
756	AACUUUUU CUGAUGA X GAA AAAGUAAC	GUUACUUUA AAAAAGUU
764	CAAGUGGA CUGAUGA X GAA ACUUUUUU	AAAAAAGUU UCCACUUG
765	UCAAGUGG CUGAUGA X GAA AACUUUUU	AAAAAGUUU CCACUUGA
766	GUCAAGUG CUGAUGA X GAA AAACUUUU	AAAAGUUUC CACUUGAC
771	AAAGUGUC CUGAUGA X GAA AGUGGAAA	UUUCCACUU GACACUUU
778	AGGGAUCA CUGAUGA X GAA AGUGUCAA	UUGACACUU UGAUCCCU
779	CAGGGAUC CUGAUGA X GAA AAGUGUCA	UGACACUUU GAUCCCUG

783	CCAUCAGG	CUGAUGA	X	GAA	AUCAAAGU	ACUUUGAUC	CCUGAUGG
801	UCCCAGAU	CUGAUGA	X	GAA	AUGCGUUU	AAACGCAUA	AUCUGGGA
804	CUGUCCCA	CUGAUGA	X	GAA	AUUAUGCG	CGCAUAAUC	UGGGACAG
814	GCCCUUUC	CUGAUGA	X	GAA	ACUGUCCC	GGGACAGUA	GAAAGGGC
824	AUAUGAUG	CUGAUGA	X	GAA	AGCCCUUU	AAAGGGCUU	CAUCAUAU
825	GAUAUGAU	CUGAUGA	X	GAA	AAGCCCUU	AAGGGCUUC	AUCAUAUC
828	UUUGAUAU	CUGAUGA	X	GAA	AUGAAGCC	GGCUUCAUC	AUAUCAAA
831	GCAUUUGA	CUGAUGA	X	GAA	AUGAUGAA	UUCAUCAUA	UCAAAUGC
833	UUGCAUUU	CUGAUGA	X	GAA	AUAUGAUG	CAUCAUAUC	AAAUGCAA
845	UUUCUUUG	CUGAUGA	X	GAA	ACGUUGCA	UGCAACGUA	CAAAGAAA
855	AGAAGCCC	CUGAUGA	X	GAA	AUUUCUUU	AAAGAAAUA	GGGCUUCU
861	CAGGUCAG	CUGAUGA	X	GAA	AGCCCUAU	AUAGGGCUU	CUGACCUG
862	ACAGGUCA	CUGAUGA	X	GAA	AAGCCCUA	UAGGGCUUC	UGACCUGU
882	UGCCCAUU	CUGAUGA	X	GAA	ACUGUUGC	GCAACAGUC	AAUGGGCA
892	CUUAUACA	CUGAUGA	X	GAA	AUGCCCAU	AUGGGCAUU	UGUAUAAG
893	UCUUAUAC	CUGAUGA	X	GAA	AAUGCCCA	UGGGCAUUU	GUAUAAGA
896	UUGUCUUA	CUGAUGA	X	GAA	ACAAAUGC	GCAUUUGUA	UAAGACAA
898	GUUUGUCU	CUGAUGA	X	GAA	AUACAAAU	AUUUGUAUA	AGACAAAC
908	GUGUGAGA	CUGAUGA	X	GAA	AGUUUGUC	GACAAACUA	UCUCACAC
910	AUGUGUGA	CUGAUGA	X	GAA	AUAGUUUG	CAAACUAUC	UCACACAU
912	CGAUGUGU	CUGAUGA	X	GAA	AGAUAGUU	AACUAUCUC	ACACAUCG
919	GGUUUGUC	CUGAUGA	X	GAA	AUGUGUGA	UCACACAUC	GACAAACC
931	UAUGAUUG	CUGAUGA	X	GAA	AUUGGUUU	AAACCAAUA	CAAUCAUA
936	ACAUCUAU	CUGAUGA	X	GAA	AUUGUAUU	AAUACAAUC	AUAGAUGU
939	UGGACAUC	CUGAUGA	X	GAA	AUGAUUGU	ACAAUCAUA	GAUGUCCA
945	CUUAUUUG	CUGAUGA	X	GAA	ACAUCUAU	AUAGAUGUC	CAAAUAAG
951	GGUGUGCU	CUGAUGA	X	GAA	AUUUGGAC	GUCCAAAUA	AGCACACC
969	AGUAAUUU	CUGAUGA	X	GAA	ACUGGGCG	CGCCCAGUC	AAAUUACU
974	CUCUAAGU	CUGAUGA	X	GAA	AUUUGACU	AGUCAAAUU	ACUUAGAG
975	CCUCUAAG	CUGAUGA	X	GAA	AAUUUGAC	GUCAAAUUA	CUUAGAGG
978	UGGCCUCU	CUGAUGA	X	GAA	AGUAAUUU	AAAUUACUU	AGAGGCCA
979	AUGGCCUC	CUGAUGA	X	GAA	AAGUAAUU	AAUUACUUA	GAGGCCAU
988	GACAAGAG	CUGAUGA	X	GAA	AUGGCCUC	GAGGCCAUA	CUCUUGUC

991	GAGGACAA	CUGAUGA X	GAA	AGUAUGGC	GCCAUACUC	UUGUCCUC
993	UUGAGGAC	CUGAUGA X	GAA	AGAGUAUG	CAUACUCUU	GUCCUCAA
996	CAAUUGAG	CUGAUGA X	GAA	ACAAGAGU	ACUCUUGUC	CUCAAUUG
999	GUACAAUU	CUGAUGA X	GAA	AGGACAAG	CUUGUCCUC	AAUUGUAC
1003	AGCAGUAC	CUGAUGA X	GAA	AUUGAGGA	UCCUCAAUU	GUACUGCU
1006	GGUAGCAG	CUGAUGA X	GAA	ACAAUUGA	UCAAUUGUA	CUGCUACC
1012	GGGAGUGG	CUGAUGA X	GAA	AGCAGUAC	GUACUGCUA	CCACUCCC
1018	GUUCAAGG	CUGAUGA X	GAA	AGUGGUAG	CUACCACUC	CCUUGAAC
1022	UCGUGUUC	CUGAUGA X	GAA	AGGGAGUG	CACUCCCUU	GAACACGA
1035	GUCAUUUG	CUGAUGA X	GAA	ACUCUCGU	ACGAGAGUU	CAAAUGAC
1036	GGUCAUUU	CUGAUGA X	GAA	AACUCUCG	CGAGAGUUC	AAAUGACC
1051	AUCAGGGU	CUGAUGA X	GAA	ACUCCAGG	CCUGGAGUU	ACCCUGAU
1052	CAUCAGGG	CUGAUGA X	GAA	AACUCCAG	CUGGAGUUA	CCCUGAUG
1069	AGCUCUCU	CUGAUGA X	GAA	AUUUUUUU	AAAAAAAUA	AGAGAGCU
1078	CCUUACGG	CUGAUGA X	GAA	AGCUCUCU	AGAGAGCUU	CCGUAAGG
1079	GCCUUACG	CUGAUGA X	GAA	AAGCUCUC	GAGAGCUUC	CGUAAGGC
1083	CGUCGCCU	CUGAUGA X	GAA	ACGGAAGC	GCUUCCGUA	AGGCGACG
1095	CUUUGGUC	CUGAUGA X	GAA	AUUCGUCG	CGACGAAUU	GACCAAAG
1108	GGCAUGGG	CUGAUGA X	GAA	AUUGCUUU	AAAGCAAUU	CCCAUGCC
1109	UGGCAUGG	CUGAUGA X	GAA	AAUUGCUU	AAGCAAUUC	CCAUGCCA
1122	CUGUAGAA	CUGAUGA X	GAA	AUGUUGGC	GCCAACAUA	UUCUACAG
1124	CACUGUAG	CUGAUGA X	GAA	AUAUGUUG	CAACAUAUU	CUACAGUG
1125	ACACUGUA	CUGAUGA X	GAA	AAUAUGUU	AACAUAUUC	UACAGUGU
1127	GAACACUG	CUGAUGA X	GAA	AGAAUAUG	CAUAUUCUA	CAGUGUUC
1134	AUAGUAAG	CUGAUGA X	GAA	ACACUGUA	UACAGUGUU	CUUACUAU
1135	AAUAGUAA	CUGAUGA X	GAA	AACACUGU	ACAGUGUUC	UUACUAUU
1137	UCAAUAGU	CUGAUGA X	GAA	AGAACACU	AGUGUUCUU	ACUAUUGA
1138	GUCAAUAG	CUGAUGA X	GAA	AAGAACAC	GUGUUCUUA	CUAUUGAC
1141	UUUGUCAA	CUGAUGA X	GAA	AGUAAGAA	UUCUUACUA	UUGACAAA
1143	AUUUUGUC	CUGAUGA X	GAA	AUAGUAAG	CUUACUAUU	GACAAAAU
1173	CAAGUAUA	CUGAUGA X	GAA	AGUCCUUU	AAAGGACUU	UAUACUUG
1174	ACAAGUAU	CUGAUGA X	GAA	AAGUCCUU	AAGGACUUU	AUACUUGU
1175	GACAAGUA	CUGAUGA X	GAA	AAAGUCCU	AGGACUUUA	UACUUGUC

1177	ACGACAAG	CUGAUGA	X	GAA	AUAAAGUC	GACUUUAUA CUUGUCGU
1180	UACACGAC	CUGAUGA	X	GAA	AGUAUAAA	UUUAUACUU GUCGUGUA
1183	CCUUACAC	CUGAUGA	X	GAA	ACAAGUAU	AUACUUGUC GUGUAAGG
1188	CCACUCCU	CUGAUGA	X	GAA	ACACGACA	UGUCGUGUA AGGAGUGG
1202	AUUUGAAU	CUGAUGA	X	GAA	AUGGUCCA	UGGACCAUC AUUCAAAU
1205	CAGAUUUG	CUGAUGA	X	GAA	AUGAUGGU	ACCAUCAUU CAAAUCUG
1206	ACAGAUUU	CUGAUGA	X	GAA	AAUGAUGG	CCAUCAUUC AAAUCUGU
1211	UGUUAACA	CUGAUGA	X	GAA	AUUUGAAU	AUUCAAAUC UGUUAACA
1215	GAGGUGUU	CUGAUGA	X	GAA	ACAGAUUU	AAAUCUGUU AACACCUC
1216	UGAGGUGU	CUGAUGA	X	GAA	AACAGAUU	AAUCUGUUA ACACCUCA
1223	UAUGCACU	CUGAUGA	X	GAA	AGGUGUUA	UAACACCUC AGUGCAUA
1231	AUCAUAUA	CUGAUGA	X	GAA	AUGCACUG	CAGUGCAUA UAUAUGAU
1233	UUAUCAUA	CUGAUGA	X	GAA	AUAUGCAC	GUGCAUAUA UAUGAUAA
1235	CUUUAUCA	CUGAUGA	X	GAA	AUAUAUGC	GCAUAUAUA UGAUAAAG
1240	GAAUGCUU	CUGAUGA	X	GAA	AUCAUAUA	UAUAUGAUA AAGCAUUC
1247	CAGUGAUG	CUGAUGA	X	GAA	AUGCUUUA	UAAAGCAUU CAUCACUG
1248	ACAGUGAU	CUGAUGA	X	GAA	AAUGCUUU	AAAGCAUUC AUCACUGU
1251	UUCACAGU	CUGAUGA	X	GAA	AUGAAUGC	GCAUUCAUC ACUGUGAA
1264	CUGUUUUC	CUGAUGA	X	GAA	AUGUUUCA	UGAAACAUC GAAAACAG
1281	ACGGUUUC	CUGAUGA	X	GAA	AGCACCUG	CAGGUGCUU GAAACCGU
1290	UUGCCAGC	CUGAUGA	X	GAA	ACGGUUUC	GAAACCGUA GCUGGCAA
1304	GCCGGUAA	CUGAUGA	X	GAA	ACCGCUUG	CAAGCGGUC UUACCGGC
1306	GAGCCGGU	CUGAUGA	X	GAA	AGACCGCU	AGCGGUCUU ACCGGCUC
1307	AGAGCCGG	CUGAUGA	X	GAA	AAGACCGC	GCGGUCUUA CCGGCUCU
1314	UUCAUAGA	CUGAUGA	X	GAA	AGCCGGUA	UACCGGCUC UCUAUGAA
1316	CUUUCAUA	CUGAUGA	X	GAA	AGAGCCGG	CCGGCUCUC UAUGAAAG
1318	CACUUUCA	CUGAUGA	X	GAA	AGAGAGCC	GGCUCUCUA UGAAAGUG
1334	GCGAGGGA	CUGAUGA	X	GAA	AUGCCUUC	GAAGGCAUU UCCCUCGC
1335	GGCGAGGG	CUGAUGA	X	GAA	AAUGCCUU	AAGGCAUUU CCCUCGCC
1336	CGGCGAGG	CUGAUGA	X	GAA	AAAUGCCU	AGGCAUUUC CCUCGCCG
1340	CUUCCGGC	CUGAUGA	X	GAA	AGGGAAAU	AUUUCCCUC GCCGGAAG
1350	AACCAUAC	CUGAUGA	X	GAA	ACUUCCGG	CCGGAAGUU GUAUGGUU
1353	UUUAACCA	CUGAUGA	X	GAA	ACAACUUC	GAAGUUGUA UGGUUAAA

1358	CAUCUUUU CUGAUGA X GAA ACCAUACA	UGUAUGGUU AAAAGAUG
1359	CCAUCUUU CUGAUGA X GAA AACCAUAC	GUAUGGUUA AAAGAUGG
1370	UCGCAGGU CUGAUGA X GAA ACCCAUCU	AGAUGGGUU ACCUGCGA
1371	GUCGCAGG CUGAUGA X GAA AACCCAUC	GAUGGGUUA CCUGCGAC
1388	AGCGAGCA CUGAUGA X GAA AUUUCUCA	UGAGAAAUC UGCUCGCU
1393	CAAAUAGC CUGAUGA X GAA AGCAGAUU	AAUCUGCUC GCUAUUUG
1397	GAGUCAAA CUGAUGA X GAA AGCGAGCA	UGCUCGCUA UUUGACUC
1399	ACGAGUCA CUGAUGA X GAA AUAGCGAG	CUCGCUAUU UGACUCGU
1400	CACGAGUC CUGAUGA X GAA AAUAGCGA	UCGCUAUUU GACUCGUG
1405	GUAGCCAC CUGAUGA X GAA AGUCAAAU	AUUUGACUC GUGGCUAC
1412	UUAACGAG CUGAUGA X GAA AGCCACGA	UCGUGGCUA CUCGUUAA
1415	UAAUUAAC CUGAUGA X GAA AGUAGCCA	UGGCUACUC GUUAAUUA
1418	UGAUAAUU CUGAUGA X GAA ACGAGUAG	CUACUCGUU AAUUAUCA
1419	UUGAUAAU CUGAUGA X GAA AACGAGUA	UACUCGUUA AUUAUCAA
1422	UCCUUGAU CUGAUGA X GAA AUUAACGA	UCGUUAAUU AUCAAGGA
1423	GUCCUUGA CUGAUGA X GAA AAUUAACG	CGUUAAUUA UCAAGGAC
1425	ACGUCCUU CUGAUGA X GAA AUAAUUAA	UUAAUUAUC AAGGACGU
1434	UCUUCAGU CUGAUGA X GAA ACGUCCUU	AAGGACGUA ACUGAAGA
1456	GAUUGUAU CUGAUGA X GAA AUUCCCUG	CAGGGAAUU AUACAAUC
1457	AGAUUGUA CUGAUGA X GAA AAUUCCCU	AGGGAAUUA UACAAUCU
1459	CAAGAUUG CUGAUGA X GAA AUAAUUCC	GGAAUUAUA CAAUCUUG
1464	CUCAGCAA CUGAUGA X GAA AUUGUAUA	UAUACAAUC UUGCUGAG
1466	UGCUCAGC CUGAUGA X GAA AGAUUGUA	UACAAUCUU GCUGAGCA
1476	GACUGUUU CUGAUGA X GAA AUGCUCAG	CUGAGCAUA AAACAGUC
1484	ACACAUUU CUGAUGA X GAA ACUGUUUU	AAAACAGUC AAAUGUGU
1493	GGUUUUUA CUGAUGA X GAA ACACAUUU	AAAUGUGUU UAAAAACC
1494	AGGUUUUU CUGAUGA X GAA AACACAUU	AAUGUGUUU AAAAACCU
1495	GAGGUUUU CUGAUGA X GAA AAACACAU	AUGUGUUUA AAAACCUC
1503	GUGGCAGU CUGAUGA X GAA AGGUUUUU	AAAAACCUC ACUGCCAC
1513	GACAAUUA CUGAUGA X GAA AGUGGCAG	CUGCCACUC UAAUUGUC
1515	UUGACAAU CUGAUGA X GAA AGAGUGGC	GCCACUCUA AUUGUCAA
1518	ACAUUGAC CUGAUGA X GAA AUUAGAGU	ACUCUAAUU GUCAAUGU
1521	UUCACAUU CUGAUGA X GAA ACAAUUAG	CUAAUUGUC AAUGUGAA

1539	UUUUCGUA CUGAUGA X GAA AUCUGGGG	CCCCAGAUU UACGAAAA
1540	CUUUUCGU CUGAUGA X GAA AAUCUGGG	CCCAGAUUU ACGAAAAG
1541	CCUUUUCG CUGAUGA X GAA AAAUCUGG	CCAGAUUUA CGAAAAGG
1556	GAAACGAU CUGAUGA X GAA ACACGGCC	GGCCGUGUC AUCGUUUC
1559	CUGGAAAC CUGAUGA X GAA AUGACACG	CGUGUCAUC GUUUCCAG
1562	GGUCUGGA CUGAUGA X GAA ACGAUGAC	GUCAUCGUU UCCAGACC
1563	GGGUCUGG CUGAUGA X GAA AACGAUGA	UCAUCGUUU CCAGACCC
1564	CGGGUCUG CUGAUGA X GAA AAACGAUG	CAUCGUUUC CAGACCCG
1576	UGGGUAGA CUGAUGA X GAA AGCCGGGU	ACCCGGCUC UCUACCCA
1578	AGUGGGUA CUGAUGA X GAA AGAGCCGG	CCGGCUCUC UACCCACU
1580	CCAGUGGG CUGAUGA X GAA AGAGAGCC	GGCUCUCUA CCCAGUGG
1602	CAAGUCAG CUGAUGA X GAA AUUUGUCU	AGACAAAUC CUGACUUG
1609	UGCGGUAC CUGAUGA X GAA AGUCAGGA	UCCUGACUU GUACCGCA
1612	AUAUGCGG CUGAUGA X GAA ACAAGUCA	UGACUUGUA CCGCAUAU
1619	GGAUACCA CUGAUGA X GAA AUGCGGUA	UACCGCAUA UGGUAUCC
1624	UUGAGGGA CUGAUGA X GAA ACCAUAUG	CAUAUGGUA UCCCUCAA
1626	GGUUGAGG CUGAUGA X GAA AUACCAUA	UAUGGUAUC CCUCAACC
1630	UGUAGGUU CUGAUGA X GAA AGGGAUAC	GUAUCCCUC AACCUACA
1636	CUUGAUUG CUGAUGA X GAA AGGUUGAG	CUCAACCUA CAAUCAAG
1641	AACCACUU CUGAUGA X GAA AUUGUAGG	CCUACAAUC AAGUGGUU
1649	GGUGCCAG CUGAUGA X GAA ACCACUUG	CAAGUGGUU CUGGCACC
1650	GGGUGCCA CUGAUGA X GAA AACCACUU	AAGUGGUUC UGGCACCC
1663	AUUAUGGU CUGAUGA X GAA ACAGGGGU	ACCCCUGUA ACCAUAAU
1669	GGAAUGAU CUGAUGA X GAA AUGGUUAC	GUAACCAUA AUCAUUCC
1672	UUCGGAAU CUGAUGA X GAA AUUAUGGU	ACCAUAAUC AUUCCGAA
1675	UGCUUCGG CUGAUGA X GAA AUGAUUAU	AUAAUCAUU CCGAAGCA
1676	UUGCUUCG CUGAUGA X GAA AAUGAUUA	UAAUCAUUC CGAAGCAA
1694	UGGAACAA CUGAUGA X GAA AGUCACAC	GUGUGACUU UUGUUCCA
1695	UUGGAACA CUGAUGA X GAA AAGUCACA	UGUGACUUU UGUUCCAA
1696	AUUGGAAC CUGAUGA X GAA AAAGUCAC	GUGACUUUU GUUCCAAU
1699	AUUAUUGG CUGAUGA X GAA ACAAAAGU	ACUUUUGUU CCAAUAAU
1700	CAUUAUUG CUGAUGA X GAA AACAAAAG	CUUUUGUUC CAAUAAUG
1705	CUCUUCAU CUGAUGA X GAA AUUGGAAC	GUUCCAAUA AUGAAGAG

1715	GGAUAAAG CUGAUGA X GAA ACUCUUCA	UGAAGAGUC CUUUAUCC
1718	CCAGGAUA CUGAUGA X GAA AGGACUCU	AGAGUCCUU UAUCCUGG
1719	UCCAGGAU CUGAUGA X GAA AAGGACUC	GAGUCCUUU AUCCUGGA
1720	AUCCAGGA CUGAUGA X GAA AAAGGACU	AGUCCUUUA UCCUGGAU
1722	GCAUCCAG CUGAUGA X GAA AUAAAGGA	UCCUUUAUC CUGGAUGC
1755	AUGCUCUC CUGAUGA X GAA AUUCUGUU	AACAGAAUU GAGAGCAU
1764	CGCUGAGU CUGAUGA X GAA AUGCUCUC	GAGAGCAUC ACUCAGCG
1768	CAUGCGCU CUGAUGA X GAA AGUGAUGC	GCAUCACUC AGCGCAUG
1782	CCUUCUAU CUGAUGA X GAA AUUGCCAU	AUGGCAAUA AUAGAAGG
1785	UUUCCUUC CUGAUGA X GAA AUUAUUGC	GCAAUAAUA GAAGGAAA
1798	AGCCAUCU CUGAUGA X GAA AUUCUUUC	GAAAGAAUA AGAUGGCU
1807	CAAGGUGC CUGAUGA X GAA AGCCAUCU	AGAUGGCUA GCACCUUG
1814	CCACAACC CUGAUGA X GAA AGGUGCUA	UAGCACCUU GGUUGUGG
1818	UCAGCCAC CUGAUGA X GAA ACCAAGGU	ACCUUGGUU GUGGCUGA
1829	AAAUUCUA CUGAUGA X GAA AGUCAGCC	GGCUGACUC UAGAAUUU
1831	AGAAAUUC CUGAUGA X GAA AGAGUCAG	CUGACUCUA GAAUUUCU
1836	AUUCCAGA CUGAUGA X GAA AUUCUAGA	UCUAGAAUU UCUGGAAU
1837	GAUUCCAG CUGAUGA X GAA AAUUCUAG	CUAGAAUUU CUGGAAUC
1838	AGAUUCCA CUGAUGA X GAA AAAUUCUA	UAGAAUUUC UGGAAUCU
1845	CAAAUGUA CUGAUGA X GAA AUUCCAGA	UCUGGAAUC UACAUUUG
1847	UGCAAAUG CUGAUGA X GAA AGAUUCCA	UGGAAUCUA CAUUUGCA
1851	GCUAUGCA CUGAUGA X GAA AUGUAGAU	AUCUACAUU UGCAUAGC
1852	AGCUAUGC CUGAUGA X GAA AAUGUAGA	UCUACAUUU GCAUAGCU
1857	UUGGAAGC CUGAUGA X GAA AUGCAAAU	AUUUGCAUA GCUUCCAA
1861	UUUAUUGG CUGAUGA X GAA AGCUAUGC	GCAUAGCUU CCAAUAAA
1862	CUUUAUUG CUGAUGA X GAA AAGCUAUG	CAUAGCUUC CAAUAAAG
1867	CCCAACUU CUGAUGA X GAA AUUGGAAG	CUUCCAAUA AAGUUGGG
1872	ACAGUCCC CUGAUGA X GAA ACUUUAUU	AAUAAAGUU GGGACUGU
1893	UAAAAGCU CUGAUGA X GAA AUGUUUCU	AGAAACAUA AGCUUUUA
1898	UGAUAUAA CUGAUGA X GAA AGCUUAUG	CAUAAGCUU UUAUAUCA
1899	GUGAUAUA CUGAUGA X GAA AAGCUUAU	AUAAGCUUU UAUAUCAC
1900	UGUGAUAU CUGAUGA X GAA AAAGCUUA	UAAGCUUUU AUAUCACA
1901	CUGUGAUA CUGAUGA X GAA AAAAGCUU	AAGCUUUUA UAUCACAG

1903	AUCUGUGA	CUGAUGA X GAA	AUAAAAGC	GCUUUUAUA	UCACAGAU
1905	ACAUCUGU	CUGAUGA X GAA	AUAUAAAA	UUUUAUAUC	ACAGAUGU
1925	UAACAUGA	CUGAUGA X GAA	ACCCAUUU	AAAUGGGUU	UCAUGUUA
1926	UUAACAUG	CUGAUGA X GAA	AACCCAUU	AAUGGGUUU	CAUGUUAA
1927	GUUAACAU	CUGAUGA X GAA	AAACCCAU	AUGGGUUUC	AUGUUAAC
1932	UCCAAGUU	CUGAUGA X GAA	ACAUGAAA	UUUCAUGUU	AACUUGGA
1933	UUCCAAGU	CUGAUGA X GAA	AACAUGAA	UUCAUGUUA	ACUUGGAA
1937	UUUUUUCC	CUGAUGA X GAA	AGUUAACA	UGUUAACUU	GGAAAAAA
1976	CUGUGCAA	CUGAUGA X GAA	ACAGUUUC	GAAACUGUC	UUGCACAG
1978	AACUGUGC	CUGAUGA X GAA	AGACAGUU	AACUGUCUU	GCACAGUU
1986	AACUUGUU	CUGAUGA X GAA	ACUGUGCA	UGCACAGUU	AACAAGUU
1987	GAACUUGU	CUGAUGA X GAA	AACUGUGC	GCACAGUUA	ACAAGUUC
1994	UGUAUAAG	CUGAUGA X GAA	ACUUGUUA	UAACAAGUU	CUUAUACA
1995	CUGUAUAA	CUGAUGA X GAA	AACUUGUU	AACAAGUUC	UUAUACAG
1997	CUCUGUAU	CUGAUGA X GAA	AGAACUUG	CAAGUUCUU	AUACAGAG
1998	UCUCUGUA	CUGAUGA X GAA	AAGAACUU	AAGUUCUUA	UACAGAGA
2000	CGUCUCUG	CUGAUGA X GAA	AUAAGAAC	GUUCUUAUA	CAGAGACG
2010	AUCCAAGU	CUGAUGA X GAA	ACGUCUCU	AGAGACGUU	ACUUGGAU
2011	AAUCCAAG	CUGAUGA X GAA	AACGUCUC	GAGACGUUA	CUUGGAUU
2014	UAAAAUCC	CUGAUGA X GAA	AGUAACGU	ACGUUACUU	GGAUUUUA
2019	CGCAGUAA	CUGAUGA X GAA	AUCCAAGU	ACUUGGAUU	UUACUGCG
2020	CCGCAGUA	CUGAUGA X GAA	AAUCCAAG	CUUGGAUUU	UACUGCGG
2021	UCCGCAGU	CUGAUGA X GAA	AAAUCCAA	UUGGAUUUU	ACUGCGGA
2022	GUCCGCAG	CUGAUGA X GAA	AAAAUCCA	UGGAUUUUA	CUGCGGAC
2034	CUGUUAUU	CUGAUGA X GAA	ACUGUCCG	CGGACAGUU	AAUAACAG
2035	UCUGUUAU	CUGAUGA X GAA	AACUGUCC	GGACAGUUA	AUAACAGA
2038	UGUUCUGU	CUGAUGA X GAA	AUUAACUG	CAGUUAAUA	ACAGAACA
2054	UAAUACUG	CUGAUGA X GAA	AGUGCAUU	AAUGCACUA	CAGUAUUA
2059	CUUGCUAA	CUGAUGA X GAA	ACUGUAGU	ACUACAGUA	UUAGCAAG
2061	UGCUUGCU	CUGAUGA X GAA	AUACUGUA	UACAGUAUU	AGCAAGCA
2062	UUGCUUGC	CUGAUGA X GAA	AAUACUGU	ACAGUAUUA	GCAAGCAA
2082	UCCUUAGU	CUGAUGA X GAA	AUGGCCAU	AUGGCCAUC	ACUAAGGA
2086	GUGCUCCU	CUGAUGA X GAA	AGUGAUGG	CCAUCACUA	AGGAGCAC

2096	GAGUGAUG CUGAUGA X GAA AGUGCUCC	GGAGCACUC CAUCACUC
2100	UUAAGAGU CUGAUGA X GAA AUGGAGUG	CACUCCAUC ACUCUUAA
2104	AAGAUUAA CUGAUGA X GAA AGUGAUGG	CCAUCACUC UUAAUCUU
2106	GUAAGAUU CUGAUGA X GAA AGAGUGAU	AUCACUCUU AAUCUUAC
2107	GGUAAGAU CUGAUGA X GAA AAGAGUGA	UCACUCUUA AUCUUACC
2110	GAUGGUAA CUGAUGA X GAA AUUAAGAG	CUCUUAAUC UUACCAUC
2112	AUGAUGGU CUGAUGA X GAA AGAUUAAG	CUUAAUCUU ACCAUCAU
2113	CAUGAUGG CUGAUGA X GAA AAGAUUAA	UUAAUCUUA CCAUCAUG
2118	ACAUUCAU CUGAUGA X GAA AUGGUAAG	CUUACCAUC AUGAAUGU
2127	UGCAGGGA CUGAUGA X GAA ACAUUCAU	AUGAAUGUU UCCCUGCA
2128	UUGCAGGG CUGAUGA X GAA AACAUUCA	UGAAUGUUU CCCUGCAA
2129	CUUGCAGG CUGAUGA X GAA AAACAUUC	GAAUGUUUC CCUGCAAG
2140	GGUGCCUG CUGAUGA X GAA AUCUUGCA	UGCAAGAUU CAGGCACC
2141	AGGUGCCU CUGAUGA X GAA AAUCUUGC	GCAAGAUUC AGGCACCU
2150	UGCAGGCA CUGAUGA X GAA AGGUGCCU	AGGCACCUA UGCCUGCA
2172	CCUGUGUA CUGAUGA X GAA ACAUUCCU	AGGAAUGUA UACACAGG
2174	CCCCUGUG CUGAUGA X GAA AUACAUUC	GAAUGUAUA CACAGGGG
2190	UUCUGGAG CUGAUGA X GAA AUUUCUUC	GAAGAAAUC CUCCAGAA
2193	UUCUUCUG CUGAUGA X GAA AGGAUUUC	GAAAUCCUC CAGAAGAA
2208	CUGAUUGU CUGAUGA X GAA AUUUCUUU	AAAGAAAUU ACAAUCAG
2209	UCUGAUUG CUGAUGA X GAA AAUUUCUU	AAGAAAUUA CAAUCAGA
2214	UGAUCUCU CUGAUGA X GAA AUUGUAAU	AUUACAAUC AGAGAUCA
2221	UGCUUCCU CUGAUGA X GAA AUCUCUGA	UCAGAGAUC AGGAAGCA
2234	GCAGGAGG CUGAUGA X GAA AUGGUGCU	AGCACCAUA CCUCCUGC
2238	UUUCGCAG CUGAUGA X GAA AGGUAUGG	CCAUACCUC CUGCGAAA
2250	UGAUCACU CUGAUGA X GAA AGGUUUCG	CGAAACCUC AGUGAUCA
2257	CACUGUGU CUGAUGA X GAA AUCACUGA	UCAGUGAUC ACACAGUG
2271	GAACUGCU CUGAUGA X GAA AUGGCCAC	GUGGCCAUC AGCAGUUC
2278	AGUGGUGG CUGAUGA X GAA ACUGCUGA	UCAGCAGUU CCACCACU
2279	AAGUGGUG CUGAUGA X GAA AACUGCUG	CAGCAGUUC CACCACUU
2287	ACAGUCUA CUGAUGA X GAA AGUGGUGG	CCACCACUU UAGACUGU
2288	GACAGUCU CUGAUGA X GAA AAGUGGUG	CACCACUUU AGACUGUC
2289	UGACAGUC CUGAUGA X GAA AAAGUGGU	ACCACUUUA GACUGUCA

2296	AUUAGCAU	CUGAUGA	X	GAA	ACAGUCUA	UAGACUGUC	AUGCUAAU
2302	GACACCAU	CUGAUGA	X	GAA	AGCAUGAC	GUCAUGCUA	AUGGUGUC
2310	GGCUCGGG	CUGAUGA	X	GAA	ACACCAUU	AAUGGUGUC	CCCGAGCC
2320	AGUGAUCU	CUGAUGA	X	GAA	AGGCUCGG	CCGAGCCUC	AGAUCACU
2325	AACCAAGU	CUGAUGA	X	GAA	AUCUGAGG	CCUCAGAUC	ACUUGGUU
2329	UUUAAACC	CUGAUGA	X	GAA	AGUGAUCU	AGAUCACUU	GGUUUAAA
2333	UGUUUUUA	CUGAUGA	X	GAA	ACCAAGUG	CACUUGGUU	UAAAAACA
2334	UUGUUUUU	CUGAUGA	X	GAA	AACCAAGU	ACUUGGUUU	AAAAACAA
2335	GUUGUUUU	CUGAUGA	X	GAA	AAACCAAG	CUUGGUUUA	AAAACAAC
2352	UCUUGUUG	CUGAUGA	X	GAA	AUUUUGUG	CACAAAAUA	CAACAAGA
2370	CCUAAAAU	CUGAUGA	X	GAA	AUUCCAGG	CCUGGAAUU	AUUUUAGG
2371	UCCUAAAA	CUGAUGA	X	GAA	AAUUCCAG	CUGGAAUUA	UUUUAGGA
2373	GGUCCUAA	CUGAUGA	X	GAA	AUAAUUCC	GGAAUUAUU	UUAGGACC
2374	UGGUCCUA	CUGAUGA	X	GAA	AAUAAUUC	GAAUUAUUU	UAGGACCA
2375	CUGGUCCU	CUGAUGA	X	GAA	AAAUAAUU	AAUUAUUUU	AGGACCAG
2376	CCUGGUCC	CUGAUGA	X	GAA	AAAAUAAU	AUUAUUUUA	GGACCAGG
2399	UUUCAAUA	CUGAUGA	X	GAA	ACAGCGUG	CACGCUGUU	UAUUGAAA
2400	CUUUCAAU	CUGAUGA	X	GAA	AACAGCGU	ACGCUGUUU	AUUGAAAG
2401	UCUUUCAA	CUGAUGA	X	GAA	AAACAGCG	CGCUGUUUA	UUGAAAGA
2403	ACUCUUUC	CUGAUGA	X	GAA	AUAAACAG	CUGUUUAUU	GAAAGAGU
2412	UCUUCUGU	CUGAUGA	X	GAA	ACUCUUUC	GAAAGAGUC	ACAGAAGA
2433	CAGUGAUA	CUGAUGA	X	GAA	ACACCUUC	GAAGGUGUC	UAUCACUG
2435	UGCAGUGA	CUGAUGA	X	GAA	AGACACCU	AGGUGUCUA	UCACUGCA
2437	UUUGCAGU	CUGAUGA	X	GAA	AUAGACAC	GUGUCUAUC	ACUGCAAA
2465	UUUCCACA	CUGAUGA	X	GAA	AGCCCUUC	GAAGGGCUC	UGUGGAAA
2476	GUAUGCUG	CUGAUGA	X	GAA	ACUUUCCA	UGGAAAGUU	CAGCAUAC
2477	GGUAUGCU	CUGAUGA	X	GAA	AACUUUCC	GGAAAGUUC	AGCAUACC
2483	CAGUGAGG	CUGAUGA	X	GAA	AUGCUGAA	UUCAGCAUA	CCUCACUG
2487	UGAACAGU	CUGAUGA	X	GAA	AGGUAUGC	GCAUACCUC	ACUGUUCA
2493	GUUCCUUG	CUGAUGA	X	GAA	ACAGUGAG	CUCACUGUU	CAAGGAAC
2494	GGUUCCUU	CUGAUGA	X	GAA	AACAGUGA	UCACUGUUC	AAGGAACC
2504	ACUUGUCC	CUGAUGA	X	GAA	AGGUUCCU	AGGAACCUC	GGACAAGU
2513	CCAGAUUA	CUGAUGA	X	GAA	ACUUGUCC	GGACAAGUC	UAAUCUGG

2515	CUCCAGAU CUGAUGA X GAA AGACUUGU	ACAAGUCUA AUCUGGAG
2518	CAGCUCCA CUGAUGA X GAA AUUAGACU	AGUCUAAUC UGGAGCUG
2529	GUUAGAGU CUGAUGA X GAA AUCAGCUC	GAGCUGAUC ACUCUAAC
2533	GCAUGUUA CUGAUGA X GAA AGUGAUCA	UGAUCACUC UAACAUGC
2535	GUGCAUGU CUGAUGA X GAA AGAGUGAU	AUCACUCUA ACAUGCAC
2560	CCAGAAGA CUGAUGA X GAA AGUCGCAG	CUGCGACUC UCUUCUGG
2562	AGCCAGAA CUGAUGA X GAA AGAGUCGC	GCGACUCUC UUCUGGCU
2564	GGAGCCAG CUGAUGA X GAA AGAGAGUC	GACUCUCUU CUGGCUCC
2565	AGGAGCCA CUGAUGA X GAA AAGAGAGU	ACUCUCUUC UGGCUCCU
2571	GUUAAUAG CUGAUGA X GAA AGCCAGAA	UUCUGGCUC CUAUUAAC
2574	AGGGUUAA CUGAUGA X GAA AGGAGCCA	UGGCUCCUA UUAACCCU
2576	GGAGGGUU CUGAUGA X GAA AUAGGAGC	GCUCCUAUU AACCCUCC
2577	AGGAGGGU CUGAUGA X GAA AAUAGGAG	CUCCUAUUA ACCCUCCU
2583	CGGAUAAG CUGAUGA X GAA AGGGUUAA	UUAACCCUC CUUAUCCG
2586	UUUCGGAU CUGAUGA X GAA AGGAGGGU	ACCCUCCUU AUCCGAAA
2587	UUUUCGGA CUGAUGA X GAA AAGGAGGG	CCCUCCUUA UCCGAAAA
2589	AUUUUUCG CUGAUGA X GAA AUAAGGAG	CUCCUUAUC CGAAAAAU
2606	CAGAAGAA CUGAUGA X GAA ACCUUUUC	GAAAAGGUC UUCUUCUG
2608	UUCAGAAG CUGAUGA X GAA AGACCUUU	AAAGGUCUU CUUCUGAA
2609	UUUCAGAA CUGAUGA X GAA AAGACCUU	AAGGUCUUC UUCUGAAA
2611	UAUUUCAG CUGAUGA X GAA AGAAGACC	GGUCUUCUU CUGAAAUA
2612	UUAUUUCA CUGAUGA X GAA AAGAAGAC	GUCUUCUUC UGAAAUAA
2619	UCAGUCUU CUGAUGA X GAA AUUUCAGA	UCUGAAAUA AAGACUGA
2630	UUGAUAGG CUGAUGA X GAA AGUCAGUC	GACUGACUA CCUAUCAA
2634	AUAAUUGA CUGAUGA X GAA AGGUAGUC	GACUACCUA UCAAUUAU
2636	UUAUAAUU CUGAUGA X GAA AUAGGUAG	CUACCUAUC AAUUAUAA
2640	UCCAUUAU CUGAUGA X GAA AUUGAUAG	CUAUCAAUU AUAAUGGA
2641	GUCCAUUA CUGAUGA X GAA AAUUGAUA	UAUCAAUUA UAAUGGAC
2643	GGGUCCAU CUGAUGA X GAA AUAAUUGA	UCAAUUAUA AUGGACCC
2661	UCCAAAGG CUGAUGA X GAA ACUUCAUC	GAUGAAGUU CCUUUGGA
2662	AUCCAAAG CUGAUGA X GAA AACUUCAU	AUGAAGUUC CUUUGGAU
2665	CUCAUCCA CUGAUGA X GAA AGGAACUU	AAGUUCCUU UGGAUGAG
2666	GCUCAUCC CUGAUGA X GAA AAGGAACU	AGUUCCUUU GGAUGAGC

2688	UCAUAAGG	CUGAUGA	X	GAA	AGCCGCUC	GAGCGGCUC	CCUUAUGA
2692	GGCAUCAU	CUGAUGA	X	GAA	AGGGAGCC	GGCUCCCUU	AUGAUGCC
2693	UGGCAUCA	CUGAUGA	X	GAA	AAGGGAGC	GCUCCCUUA	UGAUGCCA
2714	CCCGGGCA	CUGAUGA	X	GAA	ACUCCCAC	GUGGGAGUU	UGCCCGGG
2715	UCCCGGGC	CUGAUGA	X	GAA	AACUCCCA	UGGGAGUUU	GCCCGGGA
2730	CCCAGUUU	CUGAUGA	X	GAA	AGUCUCUC	GAGAGACUU	AAACUGGG
2731	GCCCAGUU	CUGAUGA	X	GAA	AAGUCUCU	AGAGACUUA	AACUGGGC
2744	UUCCAAGU	CUGAUGA	X	GAA	AUUUGCCC	GGGCAAAUC	ACUUGGAA
2748	CCUCUUCC	CUGAUGA	X	GAA	AGUGAUUU	AAAUCACUU	GGAAGAGG
2761	UUUUCCAA	CUGAUGA	X	GAA	AGCCCCUC	GAGGGGCUU	UUGGAAAA
2762	CUUUUCCA	CUGAUGA	X	GAA	AAGCCCCU	AGGGGCUUU	UGGAAAAG
2763	ACUUUUCC	CUGAUGA	X	GAA	AAAGCCCC	GGGGCUUUU	GGAAAAGU
2775	GAUGCUUG	CUGAUGA	X	GAA	ACCACUUU	AAAGUGGUU	CAAGCAUC
2776	UGAUGCUU	CUGAUGA	X	GAA	AACCACUU	AAGUGGUUC	AAGCAUCA
2783	CAAAUGCU	CUGAUGA	X	GAA	AUGCUUGA	UCAAGCAUC	AGCAUUUG
2789	UAAUGCCA	CUGAUGA	X	GAA	AUGCUGAU	AUCAGCAUU	UGGCAUUA
2790	UUAAUGCC	CUGAUGA	X	GAA	AAUGCUGA	UCAGCAUUU	GGCAUUAA
2796	GAUUUCUU	CUGAUGA	X	GAA	AUGCCAAA	UUUGGCAUU	AAGAAAUC
2797	UGAUUUCU	CUGAUGA	X	GAA	AAUGCCAA	UUGGCAUUA	AGAAAUCA
2804	ACGUAGGU	CUGAUGA	X	GAA	AUUUCUUA	UAAGAAAUC	ACCUACGU
2809	CCGGCACG	CUGAUGA	X	GAA	AGGUGAUU	AAUCACCUA	CGUGCCGG
2864	GAGCUUUG	CUGAUGA	X	GAA	ACUCGCUG	CAGCGAGUA	CAAAGCUC
2872	AGUCAUCA	CUGAUGA	X	GAA	AGCUUUGU	ACAAAGCUC	UGAUGACU
2886	AAGAUUUU	CUGAUGA	X	GAA	AGCUCAGU	ACUGAGCUA	AAAAUCUU
2892	UGGGUCAA	CUGAUGA	X	GAA	AUUUUUAG	CUAAAAAUC	UUGACCCA
2894	UGUGGGUC	CUGAUGA	X	GAA	AGAUUUUU	AAAAAUCUU	GACCCACA
2904	UGGUGGCC	CUGAUGA	X	GAA	AUGUGGGU	ACCCACAUU	GGCCACCA
2914	CACGUUCA	CUGAUGA	X	GAA	AUGGUGGC	GCCACCAUC	UGAACGUG
2925	AGCAGGUU	CUGAUGA	X	GAA	ACCACGUU	AACGUGGUU	AACCUGCU
2926	CAGCAGGU	CUGAUGA	X	GAA	AACCACGU	ACGUGGUUA	ACCUGCUG
2962	CACCAUCA	CUGAUGA	X	GAA	AGGCCCUC	GAGGGCCUC	UGAUGGUG
2973	UAUUCAAC	CUGAUGA	X	GAA	AUCACCAU	AUGGUGAUU	GUUGAAUA
2976	CAGUAUUC	CUGAUGA	X	GAA	ACAAUCAC	GUGAUUGUU	GAAUACUG

2981	AUUUGCAG	CUGAUGA	X	GAA	AUUCAACA	UGUUGAAUA	CUGCAAAU
2990	GAUUUCCA	CUGAUGA	X	GAA	AUUUGCAG	CUGCAAAUA	UGGAAAUC
2998	GUUGGAGA	CUGAUGA	X	GAA	AUUUCCAU	AUGGAAAUC	UCUCCAAC
3000	UAGUUGGA	CUGAUGA	X	GAA	AGAUUUCC	GGAAAUCUC	UCCAACUA
3002	GGUAGUUG	CUGAUGA	X	GAA	AGAGAUUU	AAAUCUCUC	CAACUACC
3008	UCUUGAGG	CUGAUGA	X	GAA	AGUUGGAG	CUCCAACUA	CCUCAAGA
3012	UUGCUCUU	CUGAUGA	X	GAA	AGGUAGUU	AACUACCUC	AAGAGCAA
3029	GAAAAAAU	CUGAUGA	X	GAA	AGUCACGU	ACGUGACUU	AUUUUUUC
3030	AGAAAAAA	CUGAUGA	X	GAA	AAGUCACG	CGUGACUUA	UUUUUUCU
3032	UGAGAAAA	CUGAUGA	X	GAA	AUAAGUCA	UGACUUAUU	UUUUCUCA
3033	UUGAGAAA	CUGAUGA	X	GAA	AAUAAGUC	GACUUAUUU	UUUCUCAA
3034	GUUGAGAA	CUGAUGA	X	GAA	AAAUAAGU	ACUUAUUUU	UUCUCAAC
3035	UGUUGAGA	CUGAUGA	X	GAA	AAAAUAAG	CUUAUUUUU	UCUCAACA
3036	UUGUUGAG	CUGAUGA	X	GAA	AAAAAUAA	UUAUUUUUU	CUCAACAA
3037	CUUGUUGA	CUGAUGA	X	GAA	AAAAAAUA	UAUUUUUUC	UCAACAAG
3039	UCCUUGUU	CUGAUGA	X	GAA	AGAAAAAA	UUUUUUCUC	AACAAGGA
3057	UCCAUGUG	CUGAUGA	X	GAA	AGUGCUGC	GCAGCACUA	CACAUGGA
3070	UUCUUUCU	CUGAUGA	X	GAA	AGGCUCCA	UGGAGCCUA	AGAAAGAA
3120	ACGCUAUC	CUGAUGA	X	GAA	AGUCUUGG	CCAAGACUA	GAUAGCGU
3124	GGUGACGC	CUGAUGA	X	GAA	AUCUAGUC	GACUAGAUA	GCGUCACC
3129	CUGCUGGU	CUGAUGA	X	GAA	ACGCUAUC	GAUAGCGUC	ACCAGCAG
3146	AGCUCGCA	CUGAUGA	X	GAA	AGCUUUCG	CGAAAGCUU	UGCGAGCU
3147	GAGCUCGC	CUGAUGA	X	GAA	AAGCUUUC	GAAAGCUUU	GCGAGCUC
3155	GAAAGCCG	CUGAUGA	X	GAA	AGCUCGCA	UGCGAGCUC	CGGCUUUC
3161	CUUCCUGA	CUGAUGA	X	GAA	AGCCGGAG	CUCCGGCUU	UCAGGAAG
3162	UCUUCCUG	CUGAUGA	X	GAA	AAGCCGGA	UCCGGCUUU	CAGGAAGA
3163	AUCUUCCU	CUGAUGA	X	GAA	AAAGCCGG	CCGGCUUUC	AGGAAGAU
3172	CAGACUUU	CUGAUGA	X	GAA	AUCUUCCU	AGGAAGAUA	AAAGUCUG
3178	AUCACUCA	CUGAUGA	X	GAA	ACUUUUAU	AUAAAAGUC	UGAGUGAU
3189	UCUUCCUC	CUGAUGA	X	GAA	ACAUCACU	AGUGAUGUU	GAGGAAGA
3205	ACCGUCAG	CUGAUGA	X	GAA	AUCCUCCU	AGGAGGAUU	CUGACGGU
3206	AACCGUCA	CUGAUGA	X	GAA	AAUCCUCC	GGAGGAUUC	UGACGGUU
3214	CUUGUAGA	CUGAUGA	X	GAA	ACCGUCAG	CUGACGGUU	UCUACAAG

3215	CCUUGUAG	CUGAUGA	X	GAA	AACCGUCA	UGACGGUUU	CUACAAGG
3216	UCCUUGUA	CUGAUGA	X	GAA	AAACCGUC	GACGGUUUC	UACAAGGA
3218	GCUCCUUG	CUGAUGA	X	GAA	AGAAACCG	CGGUUUCUA	CAAGGAGC
3231	UCCAUAGU	CUGAUGA	X	GAA	AUGGGCUC	GAGCCCAUC	ACUAUGGA
3235	AUCUUCCA	CUGAUGA	X	GAA	AGUGAUGG	CCAUCACUA	UGGAAGAU
3244	AGAAAUCA	CUGAUGA	X	GAA	AUCUUCCA	UGGAAGAUC	UGAUUUCU
3249	CUGUAAGA	CUGAUGA	X	GAA	AUCAGAUC	GAUCUGAUU	UCUUACAG
3250	ACUGUAAG	CUGAUGA	X	GAA	AAUCAGAU	AUCUGAUUU	CUUACAGU
3251	AACUGUAA	CUGAUGA	X	GAA	AAAUCAGA	UCUGAUUUC	UUACAGUU
3253	AAAACUGU	CUGAUGA	X	GAA	AGAAAUCA	UGAUUUCUU	ACAGUUUU
3254	GAAAACUG	CUGAUGA	X	GAA	AAGAAAUC	GAUUUCUUA	CAGUUUUC
3259	CACUUGAA	CUGAUGA	X	GAA	ACUGUAAG	CUUACAGUU	UUCAAGUG
3260	CCACUUGA	CUGAUGA	X	GAA	AACUGUAA	UUACAGUUU	UCAAGUGG
3261	GCCACUUG	CUGAUGA	X	GAA	AAACUGUA	UACAGUUUU	CAAGUGGC
3262	GGCCACUU	CUGAUGA	X	GAA	AAAACUGU	ACAGUUUUC	AAGUGGCC
3284	AAGACAGG	CUGAUGA	X	GAA	ACUCCAUG	CAUGGAGUU	CCUGUCUU
3285	GAAGACAG	CUGAUGA	X	GAA	AACUCCAU	AUGGAGUUC	CUGUCUUC
3290	UUCUGGAA	CUGAUGA	X	GAA	ACAGGAAC	GUUCCUGUC	UUCCAGAA
3292	CUUUCUGG	CUGAUGA	X	GAA	AGACAGGA	UCCUGUCUU	CCAGAAAG
3293	ACUUUCUG	CUGAUGA	X	GAA	AAGACAGG	CCUGUCUUC	CAGAAAGU
3306	UCCCGAUG	CUGAUGA	X	GAA	AUGCACUU	AAGUGCAUU	CAUCGGGA
3307	GUCCCGAU	CUGAUGA	X	GAA	AAUGCACU	AGUGCAUUC	AUCGGGAC
3310	CAGGUCCC	CUGAUGA	X	GAA	AUGAAUGC	GCAUUCAUC	GGGACCUG
3333	GAUAAAAG	CUGAUGA	X	GAA	AUGUUUCU	AGAAACAUU	CUUUUAUC
3334	AGAUAAAA	CUGAUGA	X	GAA	AAUGUUUC	GAAACAUUC	UUUUAUCU
3336	UCAGAUAA	CUGAUGA	X	GAA	AGAAUGUU	AACAUUCUU	UUAUCUGA
3337	CUCAGAUA	CUGAUGA	X	GAA	AAGAAUGU	ACAUUCUUU	UAUCUGAG
3338	UCUCAGAU	CUGAUGA	X	GAA	AAAGAAUG	CAUUCUUUU	AUCUGAGA
3339	UUCUCAGA	CUGAUGA	X	GAA	AAAAGAAU	AUUCUUUUA	UCUGAGAA
3341	UGUUCUCA	CUGAUGA	X	GAA	AUAAAAGA	UCUUUUAUC	UGAGAACA
3363	AAAUCACA	CUGAUGA	X	GAA	AUCUUCAC	GUGAAGAUU	UGUGAUUU
3364	AAAAUCAC	CUGAUGA	X	GAA	AAUCUUCA	UGAAGAUUU	GUGAUUUU
3370	AAGGCCAA	CUGAUGA	X	GAA	AUCACAAA	UUUGUGAUU	UUGGCCUU

3371	CAAGGCCA	CUGAUGA	X	GAA	AAUCACAA	UUGUGAUUU	UGGCCUUG
3372	GCAAGGCC	CUGAUGA	X	GAA	AAAUCACA	UGUGAUUUU	GGCCUUGC
3378	UCCCGGGC	CUGAUGA	X	GAA	AGGCCAAA	UUUGGCCUU	GCCCGGGA
3388	CUUAUAAA	CUGAUGA	X	GAA	AUCCCGGG	CCCGGGAUA	UUUAUAAG
3390	UUCUUAUA	CUGAUGA	X	GAA	AUAUCCCG	CGGGAUAUU	UAUAAGAA
3391	GUUCUUAU	CUGAUGA	X	GAA	AAUAUCCC	GGGAUAUUU	AUAAGAAC
3392	GGUUCUUA	CUGAUGA	X	GAA	AAAUAUCC	GGAUAUUUA	UAAGAACC
3394	GGGGUUCU	CUGAUGA	X	GAA	AUAAAUAU	AUAUUUAUA	AGAACCCC
3406	UCUCACAU	CUGAUGA	X	GAA	AUCGGGGU	ACCCCGAUU	AUGUGAGA
3407	UUCUCACA	CUGAUGA	X	GAA	AAUCGGGG	CCCCGAUUA	UGUGAGAA
3424	AAGUCGAG	CUGAUGA	X	GAA	AUCUCCUU	AAGGAGAUA	CUCGACUU
3427	AGGAAGUC	CUGAUGA	X	GAA	AGUAUCUC	GAGAUACUC	GACUUCCU
3432	UUCAGAGG	CUGAUGA	X	GAA	AGUCGAGU	ACUCGACUU	CCUCUGAA
3433	UUUCAGAG	CUGAUGA	X	GAA	AAGUCGAG	CUCGACUUC	CUCUGAAA
3436	CCAUUUCA	CUGAUGA	X	GAA	AGGAAGUC	GACUUCCUC	UGAAAUGG
3451	AGAUUCGG	CUGAUGA	X	GAA	AGCCAUCC	GGAUGGCUC	CCGAAUCU
3458	CAAAGAUA	CUGAUGA	X	GAA	AUUCGGGA	UCCCGAAUC	UAUCUUUG
3460	GUCAAAGA	CUGAUGA	X	GAA	AGAUUCGG	CCGAAUCUA	UCUUUGAC
3462	UUGUCAAA	CUGAUGA	X	GAA	AUAGAUUC	GAAUCUAUC	UUUGACAA
3464	UUUUGUCA	CUGAUGA	X	GAA	AGAUAGAU	AUCUAUCUU	UGACAAAA
3465	AUUUUGUC	CUGAUGA	X	GAA	AAGAUAGA	UCUAUCUUU	GACAAAAU
3474	GUGCUGUA	CUGAUGA	X	GAA	AUUUUGUC	GACAAAAUC	UACAGCAC
3476	UGGUGCUG	CUGAUGA	X	GAA	AGAUUUUG	CAAAAUCUA	CAGCACCA
3500	CUCCGUAA	CUGAUGA	X	GAA	ACCACACG	CGUGUGGUC	UUACGGAG
3502	UACUCCGU	CUGAUGA	X	GAA	AGACCACA	UGUGGUCUU	ACGGAGUA
3503	AUACUCCG	CUGAUGA	X	GAA	AAGACCAC	GUGGUCUUA	CGGAGUAU
3510	CACAGCAA	CUGAUGA	X	GAA	ACUCCGUA	UACGGAGUA	UUGCUGUG
3512	CCCACAGC	CUGAUGA	X	GAA	AUACUCCG	CGGAGUAUU	GCUGUGGG
3525	AAGGAGAA	CUGAUGA	X	GAA	AUUUCCCA	UGGGAAAUC	UUCUCCUU
3527	CUAAGGAG	CUGAUGA	X	GAA	AGAUUUCC	GGAAAUCUU	CUCCUUAG
3528	CCUAAGGA	CUGAUGA	X	GAA	AAGAUUUC	GAAAUCUUC	UCCUUAGG
3530	CACCUAAG	CUGAUGA	X	GAA	AGAAGAUU	AAUCUUCUC	CUUAGGUG
3533	ACCCACCU	CUGAUGA	X	GAA	AGGAGAAG	CUUCUCCUU	AGGUGGGU

3534	GACCCACC	CUGAUGA	X	GAA	AAGGAGAA	UUCUCCUUA GGUGGGUC
3542	GGUAUGGA	CUGAUGA	X	GAA	ACCCACCU	AGGUGGGUC UCCAUACC
3544	UGGGUAUG	CUGAUGA	X	GAA	AGACCCAC	GUGGGUCUC CAUACCCA
3548	CUCCUGGG	CUGAUGA	X	GAA	AUGGAGAC	GUCUCCAUA CCCAGGAG
3558	UCCAUUUG	CUGAUGA	X	GAA	ACUCCUGG	CCAGGAGUA CAAAUGGA
3575	GACUGCAA	CUGAUGA	X	GAA	AGUCCUCA	UGAGGACUU UUGCAGUC
3576	CGACUGCA	CUGAUGA	X	GAA	AAGUCCUC	GAGGACUUU UGCAGUCG
3577	GCGACUGC	CUGAUGA	X	GAA	AAAGUCCU	AGGACUUUU GCAGUCGC
3583	CCUCAGGC	CUGAUGA	X	GAA	ACUGCAAA	UUUGCAGUC GCCUGAGG
3613	GUACUCAG	CUGAUGA	X	GAA	AGCUCUCA	UGAGAGCUC CUGAGUAC
3620	GAGUAGAG	CUGAUGA	X	GAA	ACUCAGGA	UCCUGAGUA CUCUACUC
3623	CAGGAGUA	CUGAUGA	X	GAA	AGUACUCA	UGAGUACUC UACUCCUG
3625	UUCAGGAG	CUGAUGA	X	GAA	AGAGUACU	AGUACUCUA CUCCUGAA
3628	GAUUUCAG	CUGAUGA	X	GAA	AGUAGAGU	ACUCUACUC CUGAAAUC
3636	AUCUGAUA	CUGAUGA	X	GAA	AUUUCAGG	CCUGAAAUC UAUCAGAU
3638	UGAUCUGA	CUGAUGA	X	GAA	AGAUUUCA	UGAAAUCUA UCAGAUCA
3640	CAUGAUCU	CUGAUGA	X	GAA	AUAGAUUU	AAAUCUAUC AGAUCAUG
3645	UCCAGCAU	CUGAUGA	X	GAA	AUCUGAUA	UAUCAGAUC AUGCUGGA
3689	GUUCUGCA	CUGAUGA	X	GAA	AUCUUGGC	GCCAAGAUU UGCAGAAC
3690	AGUUCUGC	CUGAUGA	X	GAA	AAUCUUGG	CCAAGAUUU GCAGAACU
3699	UUUUCCAC	CUGAUGA	X	GAA	AGUUCUGC	GCAGAACUU GUGGAAAA
3711	AAAUCACC	CUGAUGA	X	GAA	AGUUUUUC	GAAAAACUA GGUGAUUU
3718	UUGAAGCA	CUGAUGA	X	GAA	AUCACCUA	UAGGUGAUU UGCUUCAA
3719	CUUGAAGC	CUGAUGA	X	GAA	AAUCACCU	AGGUGAUUU GCUUCAAG
3723	UUUGCUUG	CUGAUGA	X	GAA	AGCAAAUC	GAUUUGCUU CAAGCAAA
3724	AUUUGCUU	CUGAUGA	X	GAA	AAGCAAAU	AUUUGCUUC AAGCAAAU
3735	UCCUGUUG	CUGAUGA	X	GAA	ACAUUUGC	GCAAAUGUA CAACAGGA
3748	GUAGUCUU	CUGAUGA	X	GAA	ACCAUCCU	AGGAUGGUA AAGACUAC
3755	UUGGGAUG	CUGAUGA	X	GAA	AGUCUUUA	UAAAGACUA CAUCCCAA
3759	UUGAUUGG	CUGAUGA	X	GAA	AUGUAGUC	GACUACAUC CCAAUCAA
3765	AUGGCAUU	CUGAUGA	X	GAA	AUUGGGAU	AUCCCAAUC AAUGCCAU
3774	CCUGUCAG	CUGAUGA	X	GAA	AUGGCAUU	AAUGCCAUA CUGACAGG
3787	AAACCCAC	CUGAUGA	X	GAA	AUUUCCUG	CAGGAAAUA GUGGGUUU

3794	AGUAUGUA CUGAUGA X GAA ACCCACUA	UAGUGGGUU UACAUACU
3795	GAGUAUGU CUGAUGA X GAA AACCCACU	AGUGGGUUU ACAUACUC
3796	UGAGUAUG CUGAUGA X GAA AAACCCAC	GUGGGUUUA CAUACUCA
3800	GAGUUGAG CUGAUGA X GAA AUGUAAAC	GUUUACAUA CUCAACUC
3803	CAGGAGUU CUGAUGA X GAA AGUAUGUA	UACAUACUC AACUCCUG
3808	GAAGGCAG CUGAUGA X GAA AGUUGAGU	ACUCAACUC CUGCCUUC
3815	CCUCAGAG CUGAUGA X GAA AGGCAGGA	UCCUGCCUU CUCUGAGG
3816	UCCUCAGA CUGAUGA X GAA AAGGCAGG	CCUGCCUUC UCUGAGGA
3818	AGUCCUCA CUGAUGA X GAA AGAAGGCA	UGCCUUCUC UGAGGACU
3827	CCUUGAAG CUGAUGA X GAA AGUCCUCA	UGAGGACUU CUUCAAGG
3828	UCCUUGAA CUGAUGA X GAA AAGUCCUC	GAGGACUUC UUCAAGGA
3830	UUUCCUUG CUGAUGA X GAA AGAAGUCC	GGACUUCUU CAAGGAAA
3831	CUUUCCUU CUGAUGA X GAA AAGAAGUC	GACUUCUUC AAGGAAAG
3841	AGCUGAAA CUGAUGA X GAA ACUUUCCU	AGGAAAGUA UUUCAGCU
3843	GGAGCUGA CUGAUGA X GAA AUACUUUC	GAAAGUAUU UCAGCUCC
3844	CGGAGCUG CUGAUGA X GAA AAUACUUU	AAAGUAUUU CAGCUCCG
3845	UCGGAGCU CUGAUGA X GAA AAAUACUU	AAGUAUUUC AGCUCCGA
3850	AAACUUCG CUGAUGA X GAA AGCUGAAA	UUUCAGCUC CGAAGUUU
3857	CUGAAUUA CUGAUGA X GAA ACUUCGGA	UCCGAAGUU UAAUUCAG
3858	CCUGAAUU CUGAUGA X GAA AACUUCGG	CCGAAGUUU AAUUCAGG
3859	UCCUGAAU CUGAUGA X GAA AAACUUCG	CGAAGUUUA AUUCAGGA
3862	GCUUCCUG CUGAUGA X GAA AUUAAACU	AGUUUAAUU CAGGAAGC
3863	AGCUUCCU CUGAUGA X GAA AAUUAAAC	GUUUAAUUC AGGAAGCU
3872	CAUCAUCA CUGAUGA X GAA AGCUUCCU	AGGAAGCUC UGAUGAUG
3882	ACAUAUCU CUGAUGA X GAA ACAUCAUC	GAUGAUGUC AGAUAUGU
3887	CAUUUACA CUGAUGA X GAA AUCUGACA	UGUCAGAUA UGUAAAUG
3891	AAAGCAUU CUGAUGA X GAA ACAUAUCU	AGAUAUGUA AAUGCUUU
3898	GAACUUGA CUGAUGA X GAA AGCAUUUA	UAAAUGCUU UCAAGUUC
3899	UGAACUUG CUGAUGA X GAA AAGCAUUU	AAAUGCUUU CAAGUUCA
3900	AUGAACUU CUGAUGA X GAA AAAGCAUU	AAUGCUUUC AAGUUCAU
3905	GGCUCAUG CUGAUGA X GAA ACUUGAAA	UUUCAAGUU CAUGAGCC
3906	AGGCUCAU CUGAUGA X GAA AACUUGAA	UUCAAGUUC AUGAGCCU
3924	AAGGUUUU CUGAUGA X GAA AUUCUUUC	GAAAGAAUC AAAACCUU

3932	GUUCUUCA CUGAUGA X GAA AGGUUUUG	CAAAACCUU UGAAGAAC
3933	AGUUCUUC CUGAUGA X GAA AAGGUUUU	AAAACCUUU GAAGAACU
3942	UUCGGUAA CUGAUGA X GAA AGUUCUUC	GAAGAACUU UUACCGAA
3943	AUUCGGUA CUGAUGA X GAA AAGUUCUU	AAGAACUUU UACCGAAU
3944	CAUUCGGU CUGAUGA X GAA AAAGUUCU	AGAACUUUU ACCGAAUG
3945	GCAUUCGG CUGAUGA X GAA AAAAGUUC	GAACUUUUA CCGAAUGC
3959	CAAACAUG CUGAUGA X GAA AGGUGGCA	UGCCACCUC CAUGUUUG
3965	AGUCAUCA CUGAUGA X GAA ACAUGGAG	CUCCAUGUU UGAUGACU
3966	UAGUCAUC CUGAUGA X GAA AACAUGGA	UCCAUGUUU GAUGACUA
3974	CGCCCUGG CUGAUGA X GAA AGUCAUCA	UGAUGACUA CCAGGGCG
3994	GGCCAACA CUGAUGA X GAA AGUGCUGC	GCAGCACUC UGUUGGCC
3998	GAGAGGCC CUGAUGA X GAA ACAGAGUG	CACUCUGUU GGCCUCUC
4004	GCAUGGGA CUGAUGA X GAA AGGCCAAC	GUUGGCCUC UCCCAUGC
4006	CAGCAUGG CUGAUGA X GAA AGAGGCCA	UGGCCUCUC CCAUGCUG
4022	UCCAGGUG CUGAUGA X GAA AGCGCUUC	GAAGCGCUU CACCUGGA
4023	GUCCAGGU CUGAUGA X GAA AAGCGCUU	AAGCGCUUC ACCUGGAC
4052	UCUUGAGC CUGAUGA X GAA AGGCCUUG	CAAGGCCUC GCUCAAGA
4056	UCAAUCUU CUGAUGA X GAA AGCGAGGC	GCCUCGCUC AAGAUUGA
4062	CUCAAGUC CUGAUGA X GAA AUCUUGAG	CUCAAGAUU GACUUGAG
4067	UUACUCUC CUGAUGA X GAA AGUCAAUC	GAUUGACUU GAGAGUAA
4074	UUACUGGU CUGAUGA X GAA ACUCUCAA	UUGAGAGUA ACCAGUAA
4081	CUUACUUU CUGAUGA X GAA ACUGGUUA	UAACCAGUA AAAGUAAG
4087	CGACUCCU CUGAUGA X GAA ACUUUUAC	GUAAAAGUA AGGAGUCG
4094	ACAGCCCC CUGAUGA X GAA ACUCCUUA	UAAGGAGUC GGGGCUGU
4103	UGACAUCA CUGAUGA X GAA ACAGCCCC	GGGGCUGUC UGAUGUCA
4110	GGCCUGCU CUGAUGA X GAA ACAUCAGA	UCUGAUGUC AGCAGGCC
4123	AUGGCAGA CUGAUGA X GAA ACUGGGCC	GGCCCAGUU UCUGCCAU
4124	AAUGGCAG CUGAUGA X GAA AACUGGGC	GCCCAGUUU CUGCCAUU
4125	GAAUGGCA CUGAUGA X GAA AAACUGGG	CCCAGUUUC UGCCAUUC
4132	ACAGCUGG CUGAUGA X GAA AUGGCAGA	UCUGCCAUU CCAGCUGU
4133	CACAGCUG CUGAUGA X GAA AAUGGCAG	CUGCCAUUC CAGCUGUG
4149	CCUUCGCU CUGAUGA X GAA ACGUGCCC	GGGCACGUC AGCGAAGG
4169	CGUAGGUG CUGAUGA X GAA ACCUGCGC	GCGCAGGUU CACCUACG

4170	UCGUAGGU	CUGAUGA	X	GAA	AACCUGCG	CGCAGGUUC	ACCUACGA
4175	CGUGGUCG	CUGAUGA	X	GAA	AGGUGAAC	GUUCACCUA	CGACCACG
4203	CAGCACGC	CUGAUGA	X	GAA	AUUUUCCU	AGGAAAAUC	GCGUGCUG
4214	GGGGCGGG	CUGAUGA	X	GAA	AGCAGCAC	GUGCUGCUC	CCCGCCCC
4229	CCGAGUUG	CUGAUGA	X	GAA	AGUCUGGG	CCCAGACUA	CAACUCGG
4235	GGACCACC	CUGAUGA	X	GAA	AGUUGUAG	CUACAACUC	GGUGGUCC
4242	GAGUACAG	CUGAUGA	X	GAA	ACCACCGA	UCGGUGGUC	CUGUACUC
4247	GGGUGGAG	CUGAUGA	X	GAA	ACAGGACC	GGUCCUGUA	CUCCACCC
4250	GUGGGGUG	CUGAUGA	X	GAA	AGUACAGG	CCUGUACUC	CACCCCAC
4263	AAACUCUA	CUGAUGA	X	GAA	AUGGGUGG	CCACCCAUC	UAGAGUUU
4265	UCAAACUC	CUGAUGA	X	GAA	AGAUGGGU	ACCCAUCUA	GAGUUUGA
4270	UCGUGUCA	CUGAUGA	X	GAA	ACUCUAGA	UCUAGAGUU	UGACACGA
4271	UUCGUGUC	CUGAUGA	X	GAA	AACUCUAG	CUAGAGUUU	GACACGAA
4284	CUAGAAAU	CUGAUGA	X	GAA	AGGCUUCG	CGAAGCCUU	AUUUCUAG
4285	UCUAGAAA	CUGAUGA	X	GAA	AAGGCUUC	GAAGCCUUA	UUUCUAGA
4287	CUUCUAGA	CUGAUGA	X	GAA	AUAAGGCU	AGCCUUAUU	UCUAGAAG
4288	GCUUCUAG	CUGAUGA	X	GAA	AAUAAGGC	GCCUUAUUU	CUAGAAGC
4289	UGCUUCUA	CUGAUGA	X	GAA	AAAUAAGG	CCUUAUUUC	UAGAAGCA
4291	UGUGCUUC	CUGAUGA	X	GAA	AGAAAUAA	UUAUUUCUA	GAAGCACA
4305	GGUAUAAA	CUGAUGA	X	GAA	ACACAUGU	ACAUGUGUA	UUUAUACC
4307	GGGGUAUA	CUGAUGA	X	GAA	AUACACAU	AUGUGUAUU	UAUACCCC
4308	GGGGGUAU	CUGAUGA	X	GAA	AAUACACA	UGUGUAUUU	AUACCCCC
4309	UGGGGGUA	CUGAUGA	X	GAA	AAAUACAC	GUGUAUUUA	UACCCCCA
4311	CCUGGGGG	CUGAUGA	X	GAA	AUAAAUAC	GUAUUUAUA	CCCCCAGG
4325	GCAAAAGC	CUGAUGA	X	GAA	AGUUUCCU	AGGAAACUA	GCUUUUGC
4329	ACUGGCAA	CUGAUGA	X	GAA	AGCUAGUU	AACUAGCUU	UUGCCAGU
4330	UACUGGCA	CUGAUGA	X	GAA	AAGCUAGU	ACUAGCUUU	UGCCAGUA
4331	AUACUGGC	CUGAUGA	X	GAA	AAAGCUAG	CUAGCUUUU	GCCAGUAU
4338	AUGCAUAA	CUGAUGA	X	GAA	ACUGGCAA	UUGCCAGUA	UUAUGCAU
4340	AUAUGCAU	CUGAUGA	X	GAA	AUACUGGC	GCCAGUAUU	AUGCAUAU
4341	UAUAUGCA	CUGAUGA	X	GAA	AAUACUGG	CCAGUAUUA	UGCAUAUA
4347	AACUUAUA	CUGAUGA	X	GAA	AUGCAUAA	UUAUGCAUA	UAUAAGUU
4349	UAAACUUA	CUGAUGA	X	GAA	AUAUGCAU	AUGCAUAUA	UAAGUUUA

4351	UGUAAACU CUGAUGA X GAA AUAUAUGC	GCAUAUAUA AGUUUACA
4355	AAGGUGUA CUGAUGA X GAA ACUUAUAU	AUAUAAGUU UACACCUU
4356	AAAGGUGU CUGAUGA X GAA AACUUAUA	UAUAAGUUU ACACCUUU
4357	UAAAGGUG CUGAUGA X GAA AAACUUAU	AUAAGUUUA CACCUUUA
4363	GAAAGAUA CUGAUGA X GAA AGGUGUAA	UUACACCUU UAUCUUUC
4364	GGAAAGAU CUGAUGA X GAA AAGGUGUA	UACACCUUU AUCUUUCC
4365	UGGAAAGA CUGAUGA X GAA AAAGGUGU	ACACCUUUA UCUUUCCA
4367	CAUGGAAA CUGAUGA X GAA AUAAAGGU	ACCUUUAUC UUUCCAUG
4369	CCCAUGGA CUGAUGA X GAA AGAUAAAG	CUUUAUCUU UCCAUGGG
4370	UCCCAUGG CUGAUGA X GAA AAGAUAAA	UUUAUCUUU CCAUGGGA
4371	CUCCCAUG CUGAUGA X GAA AAAGAUAA	UUAUCUUUC CAUGGGAG
4389	AUCACAAA CUGAUGA X GAA AGCAGCUG	CAGCUGCUU UUUGUGAU
4390	AAUCACAA CUGAUGA X GAA AAGCAGCU	AGCUGCUUU UUGUGAUU
4391	AAAUCACA CUGAUGA X GAA AAAGCAGC	GCUGCUUUU UGUGAUUU
4392	AAAAUCAC CUGAUGA X GAA AAAAGCAG	CUGCUUUUU GUGAUUUU
4398	AUUAAAAA CUGAUGA X GAA AUCACAAA	UUUGUGAUU UUUUUAAU
4399	UAUUAAAA CUGAUGA X GAA AAUCACAA	UUGUGAUUU UUUUAAUA
4400	CUAUUAAA CUGAUGA X GAA AAAUCACA	UGUGAUUUU UUUAAUAG
4401	ACUAUUAA CUGAUGA X GAA AAAAUCAC	GUGAUUUUU UUAAUAGU
4402	CACUAUUA CUGAUGA X GAA AAAAAUCA	UGAUUUUUU UAAUAGUG
4403	GCACUAUU CUGAUGA X GAA AAAAAAUC	GAUUUUUUU AAUAGUGC
4404	AGCACUAU CUGAUGA X GAA AAAAAAAU	AUUUUUUUA AUAGUGCU
4407	AAAAGCAC CUGAUGA X GAA AUUAAAAA	UUUUUAAUA GUGCUUUU
4413	AAAAAAAA CUGAUGA X GAA AGCACUAU	AUAGUGCUU UUUUUUUU
4414	AAAAAAAA CUGAUGA X GAA AAGCACUA	UAGUGCUUU UUUUUUUU
4415	CAAAAAAA CUGAUGA X GAA AAAGCACU	AGUGCUUUU UUUUUUUG
4416	UCAAAAAA CUGAUGA X GAA AAAAGCAC	GUGCUUUUU UUUUUUGA
4417	GUCAAAAA CUGAUGA X GAA AAAAAGCA	UGCUUUUUU UUUUUGAC
4418	AGUCAAAA CUGAUGA X GAA AAAAAAGC	GCUUUUUUU UUUUGACU
4419	UAGUCAAA CUGAUGA X GAA AAAAAAAG	CUUUUUUUU UUUGACUA
4420	UUAGUCAA CUGAUGA X GAA AAAAAAAA	UUUUUUUUU UUGACUAA
4421	GUUAGUCA CUGAUGA X GAA AAAAAAAA	UUUUUUUUU UGACUAAC
4422	UGUUAGUC CUGAUGA X GAA AAAAAAAA	UUUUUUUUU GACUAACA

4427	AUUCUUGU	CUGAUGA	X	GAA	AGUCAAAA	UUUUGACUA	ACAAGAAU
4438	UCUGGAGU	CUGAUGA	X	GAA	ACAUUCUU	AAGAAUGUA	ACUCCAGA
4442	UCUAUCUG	CUGAUGA	X	GAA	AGUUACAU	AUGUAACUC	CAGAUAGA
4448	UAUUUCUC	CUGAUGA	X	GAA	AUCUGGAG	CUCCAGAUA	GAGAAAUA
4456	CUUGUCAC	CUGAUGA	X	GAA	AUUUCUCU	AGAGAAAUA	GUGACAAG
4476	UUUAGCAG	CUGAUGA	X	GAA	AGUGUUCU	AGAACACUA	CUGCUAAA
4482	UGAGGAUU	CUGAUGA	X	GAA	AGCAGUAG	CUACUGCUA	AAUCCUCA
4486	AACAUGAG	CUGAUGA	X	GAA	AUUUAGCA	UGCUAAAUC	CUCAUGUU
4489	AGUAACAU	CUGAUGA	X	GAA	AGGAUUUA	UAAAUCCUC	AUGUUACU
4494	CACUGAGU	CUGAUGA	X	GAA	ACAUGAGG	CCUCAUGUU	ACUCAGUG
4495	ACACUGAG	CUGAUGA	X	GAA	AACAUGAG	CUCAUGUUA	CUCAGUGU
4498	CUAACACU	CUGAUGA	X	GAA	AGUAACAU	AUGUUACUC	AGUGUUAG
4504	AUUUCUCU	CUGAUGA	X	GAA	ACACUGAG	CUCAGUGUU	AGAGAAAU
4505	GAUUUCUC	CUGAUGA	X	GAA	AACACUGA	UCAGUGUUA	GAGAAAUC
4513	UUAGGAAG	CUGAUGA	X	GAA	AUUUCUCU	AGAGAAAUC	CUUCCUAA
4516	GGUUUAGG	CUGAUGA	X	GAA	AGGAUUUC	GAAAUCCUU	CCUAAACC
4517	GGGUUUAG	CUGAUGA	X	GAA	AAGGAUUU	AAAUCCUUC	CUAAACCC
4520	AUUGGGUU	CUGAUGA	X	GAA	AGGAAGGA	UCCUUCCUA	AACCCAAU
4533	GAGCAGGG	CUGAUGA	X	GAA	AGUCAUUG	CAAUGACUU	CCCUGCUC
4534	GGAGCAGG	CUGAUGA	X	GAA	AAGUCAUU	AAUGACUUC	CCUGCUCC
4541	GGGGGUUG	CUGAUGA	X	GAA	AGCAGGGA	UCCCUGCUC	CAACCCCC
4557	CGUGCCCU	CUGAUGA	X	GAA	AGGUGGCG	CGCCACCUC	AGGGCACG
4576	CUCAAUCA	CUGAUGA	X	GAA	ACUGGUCC	GGACCAGUU	UGAUUGAG
4577	CCUCAAUC	CUGAUGA	X	GAA	AACUGGUC	GACCAGUUU	GAUUGAGG
4581	AGCUCCUC	CUGAUGA	X	GAA	AUCAAACU	AGUUUGAUU	GAGGAGCU
4598	CAUUGGGU	CUGAUGA	X	GAA	AUCAGUGC	GCACUGAUC	ACCCAAUG
4610	GGGUACGU	CUGAUGA	X	GAA	AUGCAUUG	CAAUGCAUC	ACGUACCC
4615	CAGUGGGG	CUGAUGA	X	GAA	ACGUGAUG	CAUCACGUA	CCCCACUG
4664	CUGGGGCU	CUGAUGA	X	GAA	ACGGGCUU	AAGCCCGUU	AGCCCCAG
4665	CCUGGGGC	CUGAUGA	X	GAA	AACGGGCU	AGCCCGUUA	GCCCCAGG
4678	CAGCCAGU	CUGAUGA	X	GAA	AUCCCCUG	CAGGGGAUC	ACUGGCUG
4700	ACUCCCGA	CUGAUGA	X	GAA	AUGUUGCU	AGCAACAUC	UCGGGAGU
4702	GGACUCCC	CUGAUGA	X	GAA	AGAUGUUG	CAACAUCUC	GGGAGUCC

4709	UGCUAGAG CUGAUGA X GAA ACUCCCGA	UCGGGAGUC CUCUAGCA
4712	GCCUGCUA CUGAUGA X GAA AGGACUCC	GGAGUCCUC UAGCAGGC
4714	AGGCCUGC CUGAUGA X GAA AGAGGACU	AGUCCUCUA GCAGGCCU
4723	ACAUGUCU CUGAUGA X GAA AGGCCUGC	GCAGGCCUA AGACAUGU
4802	GCGUCUCA CUGAUGA X GAA AUUCUUUC	GAAAGAAUU UGAGACGC
4803	UGCGUCUC CUGAUGA X GAA AAUUCUUU	AAAGAAUUU GAGACGCA
4840	GCAUUGCU CUGAUGA X GAA AGCCCCGU	ACGGGGCUC AGCAAUGC
4852	GCCACUGA CUGAUGA X GAA AUGGCAUU	AAUGCCAUU UCAGUGGC
4853	AGCCACUG CUGAUGA X GAA AAUGGCAU	AUGCCAUUU CAGUGGCU
4854	AAGCCACU CUGAUGA X GAA AAAUGGCA	UGCCAUUUC AGUGGCUU
4862	GAGCUGGG CUGAUGA X GAA AGCCACUG	CAGUGGCUU CCCAGCUC
4863	AGAGCUGG CUGAUGA X GAA AAGCCACU	AGUGGCUUC CCAGCUCU
4870	AAGGGUCA CUGAUGA X GAA AGCUGGGA	UCCCAGCUC UGACCCUU
4878	AAAUGUAG CUGAUGA X GAA AGGGUCAG	CUGACCCUU CUACAUUU
4879	CAAAUGUA CUGAUGA X GAA AAGGGUCA	UGACCCUUC UACAUUUG
4881	CUCAAAUG CUGAUGA X GAA AGAAGGGU	ACCCUUCUA CAUUUGAG
4885	GGCCCUCA CUGAUGA X GAA AUGUAGAA	UUCUACAUU UGAGGGCC
4886	GGGCCCUC CUGAUGA X GAA AAUGUAGA	UCUACAUUU GAGGGCCC
4929	AUCCAGAA CUGAUGA X GAA AUGUCCCC	GGGGACAUU UUCUGGAU
4930	AAUCCAGA CUGAUGA X GAA AAUGUCCC	GGGACAUUU UCUGGAUU
4931	GAAUCCAG CUGAUGA X GAA AAAUGUCC	GGACAUUUU CUGGAUUC
4932	AGAAUCCA CUGAUGA X GAA AAAAUGUC	GACAUUUUC UGGAUUCU
4938	CCUCCCAG CUGAUGA X GAA AUCCAGAA	UUCUGGAUU CUGGGAGG
4939	GCCUCCCA CUGAUGA X GAA AAUCCAGA	UCUGGAUUC UGGGAGGC
4963	AAAAAAGA CUGAUGA X GAA AUUUGUCC	GGACAAAUA UCUUUUUU
4965	CCAAAAAA CUGAUGA X GAA AUAUUUGU	ACAAAUAUC UUUUUUGG
4967	UUCCAAAA CUGAUGA X GAA AGAUAUUU	AAAUAUCUU UUUUGGAA
4968	GUUCCAAA CUGAUGA X GAA AAGAUAUU	AAUAUCUUU UUUGGAAC
4969	AGUUCCAA CUGAUGA X GAA AAAGAUAU	AUAUCUUUU UUGGAACU
4970	UAGUUCCA CUGAUGA X GAA AAAAGAUA	UAUCUUUUU UGGAACUA
4971	UUAGUUCC CUGAUGA X GAA AAAAAGAU	AUCUUUUUU GGAACUAA
4978	AUUUGCUU CUGAUGA X GAA AGUUCCAA	UUGGAACUA AAGCAAAU
4987	AGGUCUAA CUGAUGA X GAA AUUUGCUU	AAGCAAAUU UUAGACCU

4988	AAGGUCUA	CUGAUGA	X	GAA	AAUUUGCU	AGCAAAUUU	UAGACCUU
4989	AAAGGUCU	CUGAUGA	X	GAA	AAAUUUGC	GCAAAUUUU	AGACCUUU
4990	UAAAGGUC	CUGAUGA	X	GAA	AAAAUUUG	CAAAUUUUA	GACCUUUA
4996	CAUAGGUA	CUGAUGA	X	GAA	AGGUCUAA	UUAGACCUU	UACCUAUG
4997	CCAUAGGU	CUGAUGA	X	GAA	AAGGUCUA	UAGACCUUU	ACCUAUGG
4998	UCCAUAGG	CUGAUGA	X	GAA	AAAGGUCU	AGACCUUUA	CCUAUGGA
5002	CACUUCCA	CUGAUGA	X	GAA	AGGUAAAG	CUUUACCUA	UGGAAGUG
5013	GGACAUAG	CUGAUGA	X	GAA	ACCACUUC	GAAGUGGUU	CUAUGUCC
5014	UGGACAUA	CUGAUGA	X	GAA	AACCACUU	AAGUGGUUC	UAUGUCCA
5016	AAUGGACA	CUGAUGA	X	GAA	AGAACCAC	GUGGUUCUA	UGUCCAUU
5020	UGAGAAUG	CUGAUGA	X	GAA	ACAUAGAA	UUCUAUGUC	CAUUCUCA
5024	CGAAUGAG	CUGAUGA	X	GAA	AUGGACAU	AUGUCCAUU	CUCAUUCG
5025	ACGAAUGA	CUGAUGA	X	GAA	AAUGGACA	UGUCCAUUC	UCAUUCGU
5027	CCACGAAU	CUGAUGA	X	GAA	AGAAUGGA	UCCAUUCUC	AUUCGUGG
5030	AUGCCACG	CUGAUGA	X	GAA	AUGAGAAU	AUUCUCAUU	CGUGGCAU
5031	CAUGCCAC	CUGAUGA	X	GAA	AAUGAGAA	UUCUCAUUC	GUGGCAUG
5041	CAAAUCAA	CUGAUGA	X	GAA	ACAUGCCA	UGGCAUGUU	UUGAUUUG
5042	ACAAAUCA	CUGAUGA	X	GAA	AACAUGCC	GGCAUGUUU	UGAUUUGU
5043	UACAAAUC	CUGAUGA	X	GAA	AAACAUGC	GCAUGUUUU	GAUUUGUA
5047	GUGCUACA	CUGAUGA	X	GAA	AUCAAAAC	GUUUUGAUU	UGUAGCAC
5048	AGUGCUAC	CUGAUGA	X	GAA	AAUCAAAA	UUUUGAUUU	GUAGCACU
5051	CUCAGUGC	CUGAUGA	X	GAA	ACAAAUCA	UGAUUUGUA	GCACUGAG
5069	UCAGAGUU	CUGAUGA	X	GAA	AGUGCCAC	GUGGCACUC	AACUCUGA
5074	UGGGCUCA	CUGAUGA	X	GAA	AGUUGAGU	ACUCAACUC	UGAGCCCA
5084	GCCAAAAG	CUGAUGA	X	GAA	AUGGGCUC	GAGCCCAUA	CUUUUGGC
5087	GGAGCCAA	CUGAUGA	X	GAA	AGUAUGGG	CCCAUACUU	UUGGCUCC
5088	AGGAGCCA	CUGAUGA	X	GAA	AAGUAUGG	CCAUACUUU	UGGCUCCU
5089	GAGGAGCC	CUGAUGA	X	GAA	AAAGUAUG	CAUACUUUU	GGCUCCUC
5094	UACUAGAG	CUGAUGA	X	GAA	AGCCAAAA	UUUUGGCUC	CUCUAGUA
5097	UCUUACUA	CUGAUGA	X	GAA	AGGAGCCA	UGGCUCCUC	UAGUAAGA
5099	CAUCUUAC	CUGAUGA	X	GAA	AGAGGAGC	GCUCCUCUA	GUAAGAUG
5102	GUGCAUCU	CUGAUGA	X	GAA	ACUAGAGG	CCUCUAGUA	AGAUGCAC
5119	CUCUGGCU	CUGAUGA	X	GAA	AGUUUUCA	UGAAAACUU	AGCCAGAG

5120	ACUCUGGC	CUGAUGA	X	GAA	AAGUUUUC	GAAAACUUA	GCCAGAGU
5129	GACAACCU	CUGAUGA	X	GAA	ACUCUGGC	GCCAGAGUU	AGGUUGUC
5130	AGACAACC	CUGAUGA	X	GAA	AACUCUGG	CCAGAGUUA	GGUUGUCU
5134	CUGGAGAC	CUGAUGA	X	GAA	ACCUAACU	AGUUAGGUU	GUCUCCAG
5137	GGCCUGGA	CUGAUGA	X	GAA	ACAACCUA	UAGGUUGUC	UCCAGGCC
5139	AUGGCCUG	CUGAUGA	X	GAA	AGACAACC	GGUUGUCUC	CAGGCCAU
5156	UUCAGUGU	CUGAUGA	X	GAA	AGGCCAUC	GAUGGCCUU	ACACUGAA
5157	UUUCAGUG	CUGAUGA	X	GAA	AAGGCCAU	AUGGCCUUA	CACUGAAA
5170	UAGAAUGU	CUGAUGA	X	GAA	ACAUUUUC	GAAAAUGUC	ACAUUCUA
5175	CAAAAUAG	CUGAUGA	X	GAA	AUGUGACA	UGUCACAUU	CUAUUUUG
5176	CCAAAAUA	CUGAUGA	X	GAA	AAUGUGAC	GUCACAUUC	UAUUUUGG
5178	ACCCAAAA	CUGAUGA	X	GAA	AGAAUGUG	CACAUUCUA	UUUUGGGU
5180	AUACCCAA	CUGAUGA	X	GAA	AUAGAAUG	CAUUCUAUU	UUGGGUAU
5181	AAUACCCA	CUGAUGA	X	GAA	AAUAGAAU	AUUCUAUUU	UGGGUAUU
5182	UAAUACCC	CUGAUGA	X	GAA	AAAUAGAA	UUCUAUUUU	GGGUAUUA
5187	UAUAUUAA	CUGAUGA	X	GAA	ACCCAAAA	UUUUGGGUA	UUAAUAUA
5189	UAUAUAUU	CUGAUGA	X	GAA	AUACCCAA	UUGGGUAUU	AAUAUAUA
5190	CUAUAUAU	CUGAUGA	X	GAA	AAUACCCA	UGGGUAUUA	AUAUAUAG
5193	GGACUAUA	CUGAUGA	X	GAA	AUUAAUAC	GUAUUAAUA	UAUAGUCC
5195	CUGGACUA	CUGAUGA	X	GAA	AUAUUAAU	AUUAAUAUA	UAGUCCAG
5197	GUCUGGAC	CUGAUGA	X	GAA	AUAUAUUA	UAAUAUAUA	GUCCAGAC
5200	AGUGUCUG	CUGAUGA	X	GAA	ACUAUAUA	UAUAUAGUC	CAGACACU
5209	AUUGAGUU	CUGAUGA	X	GAA	AGUGUCUG	CAGACACUU	AACUCAAU
5210	AAUUGAGU	CUGAUGA	X	GAA	AAGUGUCU	AGACACUUA	ACUCAAUU
5214	AAGAAAUU	CUGAUGA	X	GAA	AGUUAAGU	ACUUAACUC	AAUUUCUU
5218	UACCAAGA	CUGAUGA	X	GAA	AUUGAGUU	AACUCAAUU	UCUUGGUA
5219	AUACCAAG	CUGAUGA	X	GAA	AAUUGAGU	ACUCAAUUU	CUUGGUAU
5220	AAUACCAA	CUGAUGA	X	GAA	AAAUUGAG	CUCAAUUUC	UUGGUAUU
5222	AUAAUACC	CUGAUGA	X	GAA	AGAAAUUG	CAAUUUCUU	GGUAUUAU
5226	CAGAAUAA	CUGAUGA	X	GAA	ACCAAGAA	UUCUUGGUA	UUAUUCUG
5228	AACAGAAU	CUGAUGA	X	GAA	AUACCAAG	CUUGGUAUU	AUUCUGUU
5229	AAACAGAA	CUGAUGA	X	GAA	AAUACCAA	UUGGUAUUA	UUCUGUUU
5231	CAAAACAG	CUGAUGA	X	GAA	AUAAUACC	GGUAUUAUU	CUGUUUUG

5232	GCAAAACA	CUGAUGA	X	GAA	AAUAAUAC	GUAUUAUUC	UGUUUUGC
5236	CUGUGCAA	CUGAUGA	X	GAA	ACAGAAUA	UAUUCUGUU	UUGCACAG
5237	ACUGUGCA	CUGAUGA	X	GAA	AACAGAAU	AUUCUGUUU	UGCACAGU
5238	AACUGUGC	CUGAUGA	X	GAA	AAACAGAA	UUCUGUUUU	GCACAGUU
5246	UCACAACU	CUGAUGA	X	GAA	ACUGUGCA	UGCACAGUU	AGUUGUGA
5247	UUCACAAC	CUGAUGA	X	GAA	AACUGUGC	GCACAGUUA	GUUGUGAA
5250	UCUUUCAC	CUGAUGA	X	GAA	ACUAACUG	CAGUUAGUU	GUGAAAGA
5284	CUCCUCAG	CUGAUGA	X	GAA	ACUGCAUU	AAUGCAGUC	CUGAGGAG
5296	AUGGAGAA	CUGAUGA	X	GAA	ACUCUCCU	AGGAGAGUU	UUCUCCAU
5297	UAUGGAGA	CUGAUGA	X	GAA	AACUCUCC	GGAGAGUUU	UCUCCAUA
5298	AUAUGGAG	CUGAUGA	X	GAA	AAACUCUC	GAGAGUUUU	CUCCAUAU
5299	GAUAUGGA	CUGAUGA	X	GAA	AAAACUCU	AGAGUUUUC	UCCAUAUC
5301	UUGAUAUG	CUGAUGA	X	GAA	AGAAAACU	AGUUUUCUC	CAUAUCAA
5305	CGUUUUGA	CUGAUGA	X	GAA	AUGGAGAA	UUCUCCAUA	UCAAAACG
5307	CUCGUUUU	CUGAUGA	X	GAA	AUAUGGAG	CUCCAUAUC	AAAACGAG
5336	ACCUUAUU	CUGAUGA	X	GAA	ACCUUUUU	AAAAAGGUC	AAUAAGGU
5340	CUUGACCU	CUGAUGA	X	GAA	AUUGACCU	AGGUCAAUA	AGGUCAAG
5345	CUUCCCUU	CUGAUGA	X	GAA	ACCUUAUU	AAUAAGGUC	AAGGGAAG
5361	GGUAUAGA	CUGAUGA	X	GAA	ACGGGGUC	GACCCCGUC	UCUAUACC
5363	UUGGUAUA	CUGAUGA	X	GAA	AGACGGGG	CCCCGUCUC	UAUACCAA
5365	GGUUGGUA	CUGAUGA	X	GAA	AGAGACGG	CCGUCUCUA	UACCAACC
5367	UUGGUUGG	CUGAUGA	X	GAA	AUAGAGAC	GUCUCUAUA	CCAACCAA
5382	UGUUGGUG	CUGAUGA	X	GAA	AUUGGUUU	AAACCAAUU	CACCAACA
5383	GUGUUGGU	CUGAUGA	X	GAA	AAUUGGUU	AACCAAUUC	ACCAACAC
5395	UGGGUCCC	CUGAUGA	X	GAA	ACUGUGUU	AACACAGUU	GGGACCCA
5417	ACGUGACU	CUGAUGA	X	GAA	ACUUCCUG	CAGGAAGUC	AGUCACGU
5421	GGAAACGU	CUGAUGA	X	GAA	ACUGACUU	AAGUCAGUC	ACGUUUCC
5426	GAAAAGGA	CUGAUGA	X	GAA	ACGUGACU	AGUCACGUU	UCCUUUUC
5427	UGAAAAGG	CUGAUGA	X	GAA	AACGUGAC	GUCACGUUU	CCUUUUCA
5428	AUGAAAAG	CUGAUGA	X	GAA	AAACGUGA	UCACGUUUC	CUUUUCAU
5431	UAAAUGAA	CUGAUGA	X	GAA	AGGAAACG	CGUUUCCUU	UUCAUUUA
5432	UUAAAUGA	CUGAUGA	X	GAA	AAGGAAAC	GUUUCCUUU	UCAUUUAA
5433	AUUAAAUG	CUGAUGA	X	GAA	AAAGGAAA	UUUCCUUUU	CAUUUAAU

5434	CAUUAAAU CUGAUGA X GAA AAAAGGAA	UUCCUUUUC AUUUAAUG
5437	CCCCAUUA CUGAUGA X GAA AUGAAAAG	CUUUUCAUU UAAUGGGG
5438	UCCCCAUU CUGAUGA X GAA AAUGAAAA	UUUUCAUUU AAUGGGGA
5439	AUCCCCAU CUGAUGA X GAA AAAUGAAA	UUUCAUUUA AUGGGGAU
5448	GAUAGUGG CUGAUGA X GAA AUCCCCAU	AUGGGGAUU CCACUAUC
5449	AGAUAGUG CUGAUGA X GAA AAUCCCCA	UGGGGAUUC CACUAUCU
5454	GUGUGAGA CUGAUGA X GAA AGUGGAAU	AUUCCACUA UCUCACAC
5456	UAGUGUGA CUGAUGA X GAA AUAGUGGA	UCCACUAUC UCACACUA
5458	AUUAGUGU CUGAUGA X GAA AGAUAGUG	CACUAUCUC ACACUAAU
5464	UUUCAGAU CUGAUGA X GAA AGUGUGAG	CUCACACUA AUCUGAAA
5467	UCCUUUCA CUGAUGA X GAA AUUAGUGU	ACACUAAUC UGAAAGGA
5489	CGCCAGCU CUGAUGA X GAA AUGCUCUU	AAGAGCAUU AGCUGGCG
5490	GCGCCAGC CUGAUGA X GAA AAUGCUCU	AGAGCAUUA GCUGGCGC
5501	GUGCUUAA CUGAUGA X GAA AUGCGCCA	UGGCGCAUA UUAAGCAC
5503	AAGUGCUU CUGAUGA X GAA AUAUGCGC	GCGCAUAUU AAGCACUU
5504	AAAGUGCU CUGAUGA X GAA AAUAUGCG	CGCAUAUUA AGCACUUU
5511	GGAGCUUA CUGAUGA X GAA AGUGCUUA	UAAGCACUU UAAGCUCC
5512	AGGAGCUU CUGAUGA X GAA AAGUGCUU	AAGCACUUU AAGCUCCU
5513	AAGGAGCU CUGAUGA X GAA AAAGUGCU	AGCACUUUA AGCUCCUU
5518	UACUCAAG CUGAUGA X GAA AGCUUAAA	UUUAAGCUC CUUGAGUA
5521	UUUUACUC CUGAUGA X GAA AGGAGCUU	AAGCUCCUU GAGUAAAA
5526	CACCUUUU CUGAUGA X GAA ACUCAAGG	CCUUGAGUA AAAAGGUG
5537	AAAUUACA CUGAUGA X GAA ACCACCUU	AAGGUGGUA UGUAAUUU
5541	GCAUAAAU CUGAUGA X GAA ACAUACCA	UGGUAUGUA AUUUAUGC
5544	CUUGCAUA CUGAUGA X GAA AUUACAUA	UAUGUAAUU UAUGCAAG
5545	CCUUGCAU CUGAUGA X GAA AAUUACAU	AUGUAAUUU AUGCAAGG
5546	ACCUUGCA CUGAUGA X GAA AAAUUACA	UGUAAUUUA UGCAAGGU
5555	UGGAGAAA CUGAUGA X GAA ACCUUGCA	UGCAAGGUA UUUCUCCA
5557	ACUGGAGA CUGAUGA X GAA AUACCUUG	CAAGGUAUU UCUCCAGU
5558	AACUGGAG CUGAUGA X GAA AAUACCUU	AAGGUAUUU CUCCAGUU
5559	CAACUGGA CUGAUGA X GAA AAAUACCU	AGGUAUUUC UCCAGUUG
5561	CCCAACUG CUGAUGA X GAA AGAAAUAC	GUAUUUCUC CAGUUGGG
5566	UGAGUCCC CUGAUGA X GAA ACUGGAGA	UCUCCAGUU GGGACUCA

5573	AAUAUCCU	CUGAUGA	X	GAA	AGUCCCAA	UUGGGACUC AGGAUAUU
5579	UUAACUAA	CUGAUGA	X	GAA	AUCCUGAG	CUCAGGAUA UUAGUUAA
5581	CAUUAACU	CUGAUGA	X	GAA	AUAUCCUG	CAGGAUAUU AGUUAAUG
5582	UCAUUAAC	CUGAUGA	X	GAA	AAUAUCCU	AGGAUAUUA GUUAAUGA
5585	GGCUCAUU	CUGAUGA	X	GAA	ACUAAUAU	AUAUUAGUU AAUGAGCC
5586	UGGCUCAU	CUGAUGA	X	GAA	AACUAAUA	UAUUAGUUA AUGAGCCA
5596	CUUCUAGU	CUGAUGA	X	GAA	AUGGCUCA	UGAGCCAUC ACUAGAAG
5600	UUUUCUUC	CUGAUGA	X	GAA	AGUGAUGG	CCAUCACUA GAAGAAAA
5615	CAGUUGAA	CUGAUGA	X	GAA	AUGGGCUU	AAGCCCAUU UUCAACUG
5616	GCAGUUGA	CUGAUGA	X	GAA	AAUGGGCU	AGCCCAUUU UCAACUGC
5617	AGCAGUUG	CUGAUGA	X	GAA	AAAUGGGC	GCCCAUUUU CAACUGCU
5618	AAGCAGUU	CUGAUGA	X	GAA	AAAAUGGG	CCCAUUUUC AACUGCUU
5626	AAGUUUCA	CUGAUGA	X	GAA	AGCAGUUG	CAACUGCUU UGAAACUU
5627	CAAGUUUC	CUGAUGA	X	GAA	AAGCAGUU	AACUGCUUU GAAACUUG
5634	CCCCAGGC	CUGAUGA	X	GAA	AGUUUCAA	UUGAAACUU GCCUGGGG
5644	CAUGCUCA	CUGAUGA	X	GAA	ACCCCAGG	CCUGGGGUC UGAGCAUG
5661	UGUCUCCC	CUGAUGA	X	GAA	AUUCCCAU	AUGGGAAUA GGGAGACA
5674	CCCUUUCC	CUGAUGA	X	GAA	ACCCUGUC	GACAGGGUA GGAAAGGG
5688	CUGAAGAG	CUGAUGA	X	GAA	AGGCGCCC	GGGCGCCUA CUCUUCAG
5691	ACCCUGAA	CUGAUGA	X	GAA	AGUAGGCG	CGCCUACUC UUCAGGGU
5693	AGACCCUG	CUGAUGA	X	GAA	AGAGUAGG	CCUACUCUU CAGGGUCU
5694	UAGACCCU	CUGAUGA	X	GAA	AAGAGUAG	CUACUCUUC AGGGUCUA
5700	GAUCUUUA	CUGAUGA	X	GAA	ACCCUGAA	UUCAGGGUC UAAAGAUC
5702	UUGAUCUU	CUGAUGA	X	GAA	AGACCCUG	CAGGGUCUA AAGAUCAA
5708	GCCCACUU	CUGAUGA	X	GAA	AUCUUUAG	CUAAAGAUC AAGUGGGC
5719	AGCGAUCC	CUGAUGA	X	GAA	AGGCCCAC	GUGGGCCUU GGAUCGCU
5724	AGCUUAGC	CUGAUGA	X	GAA	AUCCAAGG	CCUUGGAUC GCUAAGCU
5728	AGCCAGCU	CUGAUGA	X	GAA	AGCGAUCC	GGAUCGCUA AGCUGGCU
5737	AUCAAACA	CUGAUGA	X	GAA	AGCCAGCU	AGCUGGCUC UGUUUGAU
5741	UAGCAUCA	CUGAUGA	X	GAA	ACAGAGCC	GGCUCUGUU UGAUGCUA
5742	AUAGCAUC	CUGAUGA	X	GAA	AACAGAGC	GCUCUGUUU GAUGCUAU
5749	UGCAUAAA	CUGAUGA	X	GAA	AGCAUCAA	UUGAUGCUA UUUAUGCA
5751	CUUGCAUA	CUGAUGA	X	GAA	AUAGCAUC	GAUGCUAUU UAUGCAAG

5752	ACUUGCAU	CUGAUGA	X	GAA	AAUAGCAU	AUGCUAUUU	AUGCAAGU
5753	AACUUGCA	CUGAUGA	X	GAA	AAAUAGCA	UGCUAUUUA	UGCAAGUU
5761	UAGACCCU	CUGAUGA	X	GAA	ACUUGCAU	AUGCAAGUU	AGGGUCUA
5762	AUAGACCC	CUGAUGA	X	GAA	AACUUGCA	UGCAAGUUA	GGGUCUAU
5767	AAUACAUA	CUGAUGA	X	GAA	ACCCUAAC	GUUAGGGUC	UAUGUAUU
5769	UAAAUACA	CUGAUGA	X	GAA	AGACCCUA	UAGGGUCUA	UGUAUUUA
5773	AUCCUAAA	CUGAUGA	X	GAA	ACAUAGAC	GUCUAUGUA	UUUAGGAU
5775	GCAUCCUA	CUGAUGA	X	GAA	AUACAUAG	CUAUGUAUU	UAGGAUGC
5776	CGCAUCCU	CUGAUGA	X	GAA	AAUACAUA	UAUGUAUUU	AGGAUGCG
5777	GCGCAUCC	CUGAUGA	X	GAA	AAAUACAU	AUGUAUUUA	GGAUGCGC
5788	CUGAAGAG	CUGAUGA	X	GAA	AGGCGCAU	AUGCGCCUA	CUCUUCAG
5791	ACCCUGAA	CUGAUGA	X	GAA	AGUAGGCG	CGCCUACUC	UUCAGGGU
5793	AGACCCUG	CUGAUGA	X	GAA	AGAGUAGG	CCUACUCUU	CAGGGUCU
5794	UAGACCCU	CUGAUGA	X	GAA	AAGAGUAG	CUACUCUUC	AGGGUCUA
5800	GAUCUUUA	CUGAUGA	X	GAA	ACCCUGAA	UUCAGGGUC	UAAAGAUC
5802	UUGAUCUU	CUGAUGA	X	GAA	AGACCCUG	CAGGGUCUA	AAGAUCAA
5808	GCCCACUU	CUGAUGA	X	GAA	AUCUUUAG	CUAAAGAUC	AAGUGGGC
5819	AGCGAUCC	CUGAUGA	X	GAA	AGGCCCAC	GUGGGCCUU	GGAUCGCU
5824	AGCUUAGC	CUGAUGA	X	GAA	AUCCAAGG	CCUUGGAUC	GCUAAGCU
5828	AGCCAGCU	CUGAUGA	X	GAA	AGCGAUCC	GGAUCGCUA	AGCUGGCU
5837	AUCAAACA	CUGAUGA	X	GAA	AGCCAGCU	AGCUGGCUC	UGUUUGAU
5841	UAGCAUCA	CUGAUGA	X	GAA	ACAGAGCC	GGCUCUGUU	UGAUGCUA
5842	AUAGCAUC	CUGAUGA	X	GAA	AACAGAGC	GCUCUGUUU	GAUGCUAU
5849	UGCAUAAA	CUGAUGA	X	GAA	AGCAUCAA	UUGAUGCUA	UUUAUGCA
5851	CUUGCAUA	CUGAUGA	X	GAA	AUAGCAUC	GAUGCUAUU	UAUGCAAG
5852	ACUUGCAU	CUGAUGA	X	GAA	AAUAGCAU	AUGCUAUUU	AUGCAAGU
5853	AACUUGCA	CUGAUGA	X	GAA	AAAUAGCA	UGCUAUUUA	UGCAAGUU
5861	UAGACCCU	CUGAUGA	X	GAA	ACUUGCAU	AUGCAAGUU	AGGGUCUA
5862	AUAGACCC	CUGAUGA	X	GAA	AACUUGCA	UGCAAGUUA	GGGUCUAU
5867	AAUACAUA	CUGAUGA	X	GAA	ACCCUAAC	GUUAGGGUC	UAUGUAUU
5869	UAAAUACA	CUGAUGA	X	GAA	AGACCCUA	UAGGGUCUA	UGUAUUUA
5873	AUCCUAAA	CUGAUGA	X	GAA	ACAUAGAC	GUCUAUGUA	UUUAGGAU
5875	ACAUCCUA	CUGAUGA	X	GAA	AUACAUAG	CUAUGUAUU	UAGGAUGU

5876	GACAUCCU	CUGAUGA	X	GAA	AAUACAUA	UAUGUAUUU AGGAUGUC
5877	AGACAUCC	CUGAUGA	X	GAA	AAAUACAU	AUGUAUUUA GGAUGUCU
5884	AAGGUGCA	CUGAUGA	X	GAA	ACAUCCUA	UAGGAUGUC UGCACCUU
5892	GGCUGCAG	CUGAUGA	X	GAA	AGGUGCAG	CUGCACCUU CUGCAGCC
5893	UGGCUGCA	CUGAUGA	X	GAA	AAGGUGCA	UGCACCUUC UGCAGCCA
5904	CAGCUUCU	CUGAUGA	X	GAA	ACUGGCUG	CAGCCAGUC AGAAGCUG
5930	GAAGCAGC	CUGAUGA	X	GAA	AUCCACUG	CAGUGGAUU GCUGCUUC
5937	UCCCCAAG	CUGAUGA	X	GAA	AGCAGCAA	UUGCUGCUU CUUGGGGA
5938	CUCCCCAA	CUGAUGA	X	GAA	AAGCAGCA	UGCUGCUUC UUGGGGAG
5940	UUCUCCCC	CUGAUGA	X	GAA	AGAAGCAG	CUGCUUCUU GGGGAGAA
5953	AGGAAGCA	CUGAUGA	X	GAA	ACUCUUCU	AGAAGAGUA UGCUUCCU
5958	AUAAAAGG	CUGAUGA	X	GAA	AGCAUACU	AGUAUGCUU CCUUUUAU
5959	GAUAAAAG	CUGAUGA	X	GAA	AAGCAUAC	GUAUGCUUC CUUUUAUC
5962	AUGGAUAA	CUGAUGA	X	GAA	AGGAAGCA	UGCUUCCUU UUAUCCAU
5963	CAUGGAUA	CUGAUGA	X	GAA	AAGGAAGC	GCUUCCUUU UAUCCAUG
5964	ACAUGGAU	CUGAUGA	X	GAA	AAAGGAAG	CUUCCUUUU AUCCAUGU
5965	UACAUGGA	CUGAUGA	X	GAA	AAAAGGAA	UUCCUUUUA UCCAUGUA
5967	AUUACAUG	CUGAUGA	X	GAA	AUAAAAGG	CCUUUUAUC CAUGUAAU
5973	AGUUAAAU	CUGAUGA	X	GAA	ACAUGGAU	AUCCAUGUA AUUUAACU
5976	UACAGUUA	CUGAUGA	X	GAA	AUUACAUG	CAUGUAAUU UAACUGUA
5977	CUACAGUU	CUGAUGA	X	GAA	AAUUACAU	AUGUAAUUU AACUGUAG
5978	UCUACAGU	CUGAUGA	X	GAA	AAAUUACA	UGUAAUUUA ACUGUAGA
5984	UCAGGUUC	CUGAUGA	X	GAA	ACAGUUAA	UUAACUGUA GAACCUGA
5996	GUUACUUA	CUGAUGA	X	GAA	AGCUCAGG	CCUGAGCUC UAAGUAAC
5998	CGGUUACU	CUGAUGA	X	GAA	AGAGCUCA	UGAGCUCUA AGUAACCG
6002	UCUUCGGU	CUGAUGA	X	GAA	ACUUAGAG	CUCUAAGUA ACCGAAGA
6015	CAGAGGCA	CUGAUGA	X	GAA	ACAUUCUU	AAGAAUGUA UGCCUCUG
6021	UAAGAACA	CUGAUGA	X	GAA	AGGCAUAC	GUAUGCCUC UGUUCUUA
6025	CACAUAAG	CUGAUGA	X	GAA	ACAGAGGC	GCCUCUGUU CUUAUGUG
6026	GCACAUAA	CUGAUGA	X	GAA	AACAGAGG	CCUCUGUUC UUAUGUGC
6028	UGGCACAU	CUGAUGA	X	GAA	AGAACAGA	UCUGUUCUU AUGUGCCA
6029	GUGGCACA	CUGAUGA	X	GAA	AAGAACAG	CUGUUCUUA UGUGCCAC
6040	UAAACAAG	CUGAUGA	X	GAA	AUGUGGCA	UGCCACAUC CUUGUUUA

6043	CUUUAAAC	CUGAUGA	X	GAA	AGGAUGUG	CACAUCCUU	GUUUAAAG
6046	AGCCUUUA	CUGAUGA	X	GAA	ACAAGGAU	AUCCUUGUU	UAAAGGCU
6047	GAGCCUUU	CUGAUGA	X	GAA	AACAAGGA	UCCUUGUUU	AAAGGCUC
6048	AGAGCCUU	CUGAUGA	X	GAA	AAACAAGG	CCUUGUUUA	AAGGCUCU
6055	CAUACAGA	CUGAUGA	X	GAA	AGCCUUUA	UAAAGGCUC	UCUGUAUG
6057	UUCAUACA	CUGAUGA	X	GAA	AGAGCCUU	AAGGCUCUC	UGUAUGAA
6061	UCUCUUCA	CUGAUGA	X	GAA	ACAGAGAG	CUCUCUGUA	UGAAGAGA
6079	GUGCUGAU	CUGAUGA	X	GAA	ACGGUCCC	GGGACCGUC	AUCAGCAC
6082	AAUGUGCU	CUGAUGA	X	GAA	AUGACGGU	ACCGUCAUC	AGCACAUU
6090	CACUAGGG	CUGAUGA	X	GAA	AUGUGCUG	CAGCACAUU	CCCUAGUG
6091	UCACUAGG	CUGAUGA	X	GAA	AAUGUGCU	AGCACAUUC	CCUAGUGA
6095	AGGCUCAC	CUGAUGA	X	GAA	AGGGAAUG	CAUUCCCUA	GUGAGCCU
6104	GGAGCCAG	CUGAUGA	X	GAA	AGGCUCAC	GUGAGCCUA	CUGGCUCC
6111	GCUGCCAG	CUGAUGA	X	GAA	AGCCAGUA	UACUGGCUC	CUGGCAGC
6124	UUCCACAA	CUGAUGA	X	GAA	AGCCGCUG	CAGCGGCUU	UUGUGGAA
6125	CUUCCACA	CUGAUGA	X	GAA	AAGCCGCU	AGCGGCUUU	UGUGGAAG
6126	UCUUCCAC	CUGAUGA	X	GAA	AAAGCCGC	GCGGCUUUU	GUGGAAGA
6137	UGGCUAGU	CUGAUGA	X	GAA	AGUCUUCC	GGAAGACUC	ACUAGCCA
6141	CUUCUGGC	CUGAUGA	X	GAA	AGUGAGUC	GACUCACUA	GCCAGAAG
6166	GUGGAGAG	CUGAUGA	X	GAA	ACUGUCCC	GGGACAGUC	CUCUCCAC
6169	UUGGUGGA	CUGAUGA	X	GAA	AGGACUGU	ACAGUCCUC	UCCACCAA
6171	UCUUGGUG	CUGAUGA	X	GAA	AGAGGACU	AGUCCUCUC	CACCAAGA
6181	UGGAUUUA	CUGAUGA	X	GAA	AUCUUGGU	ACCAAGAUC	UAAAUCCA
6183	UUUGGAUU	CUGAUGA	X	GAA	AGAUCUUG	CAAGAUCUA	AAUCCAAA
6187	UUUGUUUG	CUGAUGA	X	GAA	AUUUAGAU	AUCUAAAUC	CAAACAAA
6204	UCUGGCUC	CUGAUGA	X	GAA	AGCCUGCU	AGCAGGCUA	GAGCCAGA
6226	ACAACAAA	CUGAUGA	X	GAA	AUUUGUCC	GGACAAAUC	UUUGUUGU
6228	GAACAACA	CUGAUGA	X	GAA	AGAUUUGU	ACAAAUCUU	UGUUGUUC
6229	GGAACAAC	CUGAUGA	X	GAA	AAGAUUUG	CAAAUCUUU	GUUGUUCC
6232	AGAGGAAC	CUGAUGA	X	GAA	ACAAAGAU	AUCUUUGUU	GUUCCUCU
6235	AGAAGAGG	CUGAUGA	X	GAA	ACAACAAA	UUUGUUGUU	CCUCUUCU
6236	AAGAAGAG	CUGAUGA	X	GAA	AACAACAA	UUGUUGUUC	CUCUUCUU
6239	GUAAAGAA	CUGAUGA	X	GAA	AGGAACAA	UUGUUCCUC	UUCUUUAC

6241	GUGUAAAG	CUGAUGA	X	GAA	AGAGGAAC	GUUCCUCUU	CUUUACAC
6242	UGUGUAAA	CUGAUGA	X	GAA	AAGAGGAA	UUCCUCUUC	UUUACACA
6244	UAUGUGUA	CUGAUGA	X	GAA	AGAAGAGG	CCUCUUCUU	UACACAUA
6245	GUAUGUGU	CUGAUGA	X	GAA	AAGAAGAG	CUCUUCUUU	ACACAUAC
6246	CGUAUGUG	CUGAUGA	X	GAA	AAAGAAGA	UCUUCUUUA	CACAUACG
6252	GGUUUGCG	CUGAUGA	X	GAA	AUGUGUAA	UUACACAUA	CGCAAACC
6280	AUUUAUAA	CUGAUGA	X	GAA	AUUGCCAG	CUGGCAAUU	UUAUAAAU
6281	GAUUUAUA	CUGAUGA	X	GAA	AAUUGCCA	UGGCAAUUU	UAUAAAUC
6282	UGAUUUAU	CUGAUGA	X	GAA	AAAUUGCC	GGCAAUUUU	AUAAAUCA
6283	CUGAUUUA	CUGAUGA	X	GAA	AAAAUUGC	GCAAUUUUA	UAAAUCAG
6285	ACCUGAUU	CUGAUGA	X	GAA	AUAAAAUU	AAUUUUAUA	AAUCAGGU
6289	AGUUACCU	CUGAUGA	X	GAA	AUUUAUAA	UUAUAAAUC	AGGUAACU
6294	CUUCCAGU	CUGAUGA	X	GAA	ACCUGAUU	AAUCAGGUA	ACUGGAAG
6308	CUGAGUUU	CUGAUGA	X	GAA	ACCUCCUU	AAGGAGGUU	AAACUCAG
6309	UCUGAGUU	CUGAUGA	X	GAA	AACCUCCU	AGGAGGUUA	AACUCAGA
6314	UUUUUUCU	CUGAUGA	X	GAA	AGUUUAAC	GUUAAACUC	AGAAAAAA
6331	AAUUGACU	CUGAUGA	X	GAA	AGGUCUUC	GAAGACCUC	AGUCAAUU
6335	AGAGAAUU	CUGAUGA	X	GAA	ACUGAGGU	ACCUCAGUC	AAUUCUCU
6339	AAGUAGAG	CUGAUGA	X	GAA	AUUGACUG	CAGUCAAUU	CUCUACUU
6340	AAAGUAGA	CUGAUGA	X	GAA	AAUUGACU	AGUCAAUUC	UCUACUUU
6342	AAAAAGUA	CUGAUGA	X	GAA	AGAAUUGA	UCAAUUCUC	UACUUUUU
6344	AAAAAAAG	CUGAUGA	X	GAA	AGAGAAUU	AAUUCUCUA	CUUUUUUU
6347	AAAAAAAA	CUGAUGA	X	GAA	AGUAGAGA	UCUCUACUU	UUUUUUUU
6348	AAAAAAAA	CUGAUGA	X	GAA	AAGUAGAG	CUCUACUUU	UUUUUUUU
6349	AAAAAAAA	CUGAUGA	X	GAA	AAAGUAGA	UCUACUUUU	UUUUUUUU
6350	AAAAAAAA	CUGAUGA	X	GAA	AAAAGUAG	CUACUUUUU	UUUUUUUU
6351	AAAAAAAA	CUGAUGA	X	GAA	AAAAAGUA	UACUUUUUU	UUUUUUUU
6352	AAAAAAAA	CUGAUGA	X	GAA	AAAAAAGU	ACUUUUUUU	UUUUUUUU
6353	AAAAAAAA	CUGAUGA	X	GAA	AAAAAAAG	CUUUUUUUU	UUUUUUUU
6354	GAAAAAAA	CUGAUGA	X	GAA	AAAAAAAA	UUUUUUUUU	UUUUUUUC
6355	GGAAAAAA	CUGAUGA	X	GAA	AAAAAAAA	UUUUUUUUU	UUUUUUCC
6356	UGGAAAAA	CUGAUGA	X	GAA	AAAAAAAA	UUUUUUUUU	UUUUUCCA
6357	UUGGAAAA	CUGAUGA	X	GAA	AAAAAAAA	UUUUUUUUU	UUUUCCAA

6358	UUUGGAAA CUGAUGA X GAA AAAAAAAA	UUUUUUUU UUUCCAAA
6359	AUUUGGAA CUGAUGA X GAA AAAAAAAA	UUUUUUUU UUCCAAAU
6360	GAUUUGGA CUGAUGA X GAA AAAAAAAA	UUUUUUUU UCCAAAUC
6361	UGAUUUGG CUGAUGA X GAA AAAAAAAA	UUUUUUUU CCAAAUCA
6362	CUGAUUUG CUGAUGA X GAA AAAAAAAA	UUUUUUUC CAAAUCAG
6368	UAUUAUCU CUGAUGA X GAA AUUUGGAA	UUCCAAAUC AGAUAAUA
6373	UGGGCUAU CUGAUGA X GAA AUCUGAUU	AAUCAGAUA AUAGCCCA
6376	UGCUGGGC CUGAUGA X GAA AUUAUCUG	CAGAUAAUA GCCCAGCA
6388	GUUAUCAC CUGAUGA X GAA AUUUGCUG	CAGCAAAUA GUGAUAAC
6394	UUAUUUGU CUGAUGA X GAA AUCACUAU	AUAGUGAUA ACAAAUAA
6401	UAAGGUUU CUGAUGA X GAA AUUUGUUA	UAACAAAUA AAACCUUA
6408	GAACAGCU CUGAUGA X GAA AGGUUUUA	UAAAACCUU AGCUGUUC
6409	UGAACAGC CUGAUGA X GAA AAGGUUUU	AAAACCUUA GCUGUUCA
6415	AAGACAUG CUGAUGA X GAA ACAGCUAA	UUAGCUGUU CAUGUCUU
6416	CAAGACAU CUGAUGA X GAA AACAGCUA	UAGCUGUUC AUGUCUUG
6421	GAAAUCAA CUGAUGA X GAA ACAUGAAC	GUUCAUGUC UUGAUUUC
6423	UUGAAAUC CUGAUGA X GAA AGACAUGA	UCAUGUCUU GAUUUCAA
6427	AUUAUUGA CUGAUGA X GAA AUCAAGAC	GUCUUGAUU UCAAUAAU
6428	AAUUAUUG CUGAUGA X GAA AAUCAAGA	UCUUGAUUU CAAUAAUU
6429	UAAUUAUU CUGAUGA X GAA AAAUCAAG	CUUGAUUUC AAUAAUUA
6433	GAAUUAAU CUGAUGA X GAA AUUGAAAU	AUUUCAAUA AUUAAUUC
6436	UAAGAAUU CUGAUGA X GAA AUUAUUGA	UCAAUAAUU AAUUCUUA
6437	UUAAGAAU CUGAUGA X GAA AAUUAUUG	CAAUAAUUA AUUCUUAA
6440	UGAUUAAG CUGAUGA X GAA AUUAAUUA	UAAUUAAUU CUUAAUCA
6441	AUGAUUAA CUGAUGA X GAA AAUUAAUU	AAUUAAUUC UUAAUCAU
6443	UAAUGAUU CUGAUGA X GAA AGAAUUAA	UUAAUUCUU AAUCAUUA
6444	UUAAUGAU CUGAUGA X GAA AAGAAUUA	UAAUUCUUA AUCAUUAA
6447	CUCUUAAU CUGAUGA X GAA AUUAAGAA	UUCUUAAUC AUUAAGAG
6450	GGUCUCUU CUGAUGA X GAA AUGAUUAA	UUAAUCAUU AAGAGACC
6451	UGGUCUCU CUGAUGA X GAA AAUGAUUA	UAAUCAUUA AGAGACCA
6461	GUAUUUAU CUGAUGA X GAA AUGGUCUC	GAGACCAUA AUAAAUAC
6464	GGAGUAUU CUGAUGA X GAA AUUAUGGU	ACCAUAAUA AAUACUCC
6468	AAAAGGAG CUGAUGA X GAA AUUUAUUA	UAAUAAAUA CUCCUUUU

6471	UUGAAAAG CUGAUGA X GAA AGUAUUUA	UAAAUACUC CUUUUCAA
6474	CUCUUGAA CUGAUGA X GAA AGGAGUAU	AUACUCCUU UUCAAGAG
6475	UCUCUUGA CUGAUGA X GAA AAGGAGUA	UACUCCUUU UCAAGAGA
6476	UUCUCUUG CUGAUGA X GAA AAAGGAGU	ACUCCUUUU CAAGAGAA
6477	UUUCUCUU CUGAUGA X GAA AAAAGGAG	CUCCUUUUC AAGAGAAA
6497	ACAAUUCU CUGAUGA X GAA AUGGUUUU	AAAACCAUU AGAAUUGU
6498	AACAAUUC CUGAUGA X GAA AAUGGUUU	AAACCAUUA GAAUUGUU
6503	UGAGUAAC CUGAUGA X GAA AUUCUAAU	AUUAGAAUU GUUACUCA
6506	AGCUGAGU CUGAUGA X GAA ACAAUUCU	AGAAUUGUU ACUCAGCU
6507	GAGCUGAG CUGAUGA X GAA AACAAUUC	GAAUUGUUA CUCAGCUC
6510	AAGGAGCU CUGAUGA X GAA AGUAACAA	UUGUUACUC AGCUCCUU
6515	GUUUGAAG CUGAUGA X GAA AGCUGAGU	ACUCAGCUC CUUCAAAC
6518	UGAGUUUG CUGAUGA X GAA AGGAGCUG	CAGCUCCUU CAAACUCA
6519	CUGAGUUU CUGAUGA X GAA AAGGAGCU	AGCUCCUUC AAACUCAG
6525	ACAAACCU CUGAUGA X GAA AGUUUGAA	UUCAAACUC AGGUUUGU
6530	AUGCUACA CUGAUGA X GAA ACCUGAGU	ACUCAGGUU UGUAGCAU
6531	UAUGCUAC CUGAUGA X GAA AACCUGAG	CUCAGGUUU GUAGCAUA
6534	AUGUAUGC CUGAUGA X GAA ACAAACCU	AGGUUUGUA GCAUACAU
6539	GACUCAUG CUGAUGA X GAA AUGCUACA	UGUAGCAUA CAUGAGUC
6547	GAUGGAUG CUGAUGA X GAA ACUCAUGU	ACAUGAGUC CAUCCAUC
6551	GACUGAUG CUGAUGA X GAA AUGGACUC	GAGUCCAUC CAUCAGUC
6555	CUUUGACU CUGAUGA X GAA AUGGAUGG	CCAUCCAUC AGUCAAAG
6559	CAUUCUUU CUGAUGA X GAA ACUGAUGG	CCAUCAGUC AAAGAAUG
6570	CCAGAUGG CUGAUGA X GAA ACCAUUCU	AGAAUGGUU CCAUCUGG
6571	UCCAGAUG CUGAUGA X GAA AACCAUUC	GAAUGGUUC CAUCUGGA
6575	AGACUCCA CUGAUGA X GAA AUGGAACC	GGUUCCAUC UGGAGUCU
6582	UACAUUAA CUGAUGA X GAA ACUCCAGA	UCUGGAGUC UUAAUGUA
6584	UCUACAUU CUGAUGA X GAA AGACUCCA	UGGAGUCUU AAUGUAGA
6585	UUCUACAU CUGAUGA X GAA AAGACUCC	GGAGUCUUA AUGUAGAA
6590	UUUCUUUC CUGAUGA X GAA ACAUUAAG	CUUAAUGUA GAAAGAAA
6609	AUUAUUAC CUGAUGA X GAA AGUCUCCA	UGGAGACUU GUAAUAAU
6612	CUCAUUAU CUGAUGA X GAA ACAAGUCU	AGACUUGUA AUAAUGAG
6615	UAGCUCAU CUGAUGA X GAA AUUACAAG	CUUGUAAUA AUGAGCUA

6623	UUUGUAAC	CUGAUGA	X	GAA	AGCUCAUU	AAUGAGCUA	GUUACAAA
6626	CACUUUGU	CUGAUGA	X	GAA	ACUAGCUC	GAGCUAGUU	ACAAAGUG
6627	GCACUUUG	CUGAUGA	X	GAA	AACUAGCU	AGCUAGUUA	CAAAGUGC
6637	UAAUGAAC	CUGAUGA	X	GAA	AGCACUUU	AAAGUGCUU	GUUCAUUA
6640	UUUUAAUG	CUGAUGA	X	GAA	ACAAGCAC	GUGCUUGUU	CAUUAAAA
6641	AUUUUAAU	CUGAUGA	X	GAA	AACAAGCA	UGCUUGUUC	AUUAAAAU
6644	GCUAUUUU	CUGAUGA	X	GAA	AUGAACAA	UUGUUCAUU	AAAAUAGC
6645	UGCUAUUU	CUGAUGA	X	GAA	AAUGAACA	UGUUCAUUA	AAAUAGCA
6650	UUCAGUGC	CUGAUGA	X	GAA	AUUUUAAU	AUUAAAAUA	GCACUGAA
6662	CAUGUUUC	CUGAUGA	X	GAA	AUUUUCAG	CUGAAAAUU	GAAACAUG
6674	UAUCAGUU	CUGAUGA	X	GAA	AUUCAUGU	ACAUGAAUU	AACUGAUA
6675	UUAUCAGU	CUGAUGA	X	GAA	AAUUCAUG	CAUGAAUUA	ACUGAUAA
6682	UGGAAUAU	CUGAUGA	X	GAA	AUCAGUUA	UAACUGAUA	AUAUUCCA
6685	GAUUGGAA	CUGAUGA	X	GAA	AUUAUCAG	CUGAUAAUA	UUCCAAUC
6687	AUGAUUGG	CUGAUGA	X	GAA	AUAUUAUC	GAUAAUAUU	CCAAUCAU
6688	AAUGAUUG	CUGAUGA	X	GAA	AAUAUUAU	AUAAUAUUC	CAAUCAUU
6693	UGGCAAAU	CUGAUGA	X	GAA	AUUGGAAU	AUUCCAAUC	AUUUGCCA
6696	AAAUGGCA	CUGAUGA	X	GAA	AUGAUUGG	CCAAUCAUU	UGCCAUUU
6697	UAAAUGGC	CUGAUGA	X	GAA	AAUGAUUG	CAAUCAUUU	GCCAUUUA
6703	UUGUCAUA	CUGAUGA	X	GAA	AUGGCAAA	UUUGCCAUU	UAUGACAA
6704	UUUGUCAU	CUGAUGA	X	GAA	AAUGGCAA	UUGCCAUUU	AUGACAAA
6705	UUUUGUCA	CUGAUGA	X	GAA	AAAUGGCA	UGCCAUUUA	UGACAAAA
6719	UUAGUGCC	CUGAUGA	X	GAA	ACCAUUUU	AAAAUGGUU	GGCACUAA
6726	UUCUUUGU	CUGAUGA	X	GAA	AGUGCCAA	UUGGCACUA	ACAAAGAA
6743	CUGAAAGG	CUGAUGA	X	GAA	AGUGCUCG	CGAGCACUU	CCUUUCAG
6744	UCUGAAAG	CUGAUGA	X	GAA	AAGUGCUC	GAGCACUUC	CUUUCAGA
6747	AACUCUGA	CUGAUGA	X	GAA	AGGAAGUG	CACUUCCUU	UCAGAGUU
6748	AAACUCUG	CUGAUGA	X	GAA	AAGGAAGU	ACUUCCUUU	CAGAGUUU
6749	GAAACUCU	CUGAUGA	X	GAA	AAAGGAAG	CUUCCUUUC	AGAGUUUC
6755	AUCUCAGA	CUGAUGA	X	GAA	ACUCUGAA	UUCAGAGUU	UCUGAGAU
6756	UAUCUCAG	CUGAUGA	X	GAA	AACUCUGA	UCAGAGUUU	CUGAGAUA
6757	UUAUCUCA	CUGAUGA	X	GAA	AAACUCUG	CAGAGUUUC	UGAGAUAA
6764	ACGUACAU	CUGAUGA	X	GAA	AUCUCAGA	UCUGAGAUA	AUGUACGU

6769	GUUCCACG	CUGAUGA X GAA	ACAUUAUC		GAUAAUGUA	CGUGGAAC
6781	UCCACCCA	CUGAUGA X GAA	ACUGUUCC		GGAACAGUC	UGGGUGGA
6814	AAGACACA	CUGAUGA X GAA	ACUUGCAC		GUGCAAGUC	UGUGUCUU
6820	ACUGACAA	CUGAUGA X GAA	ACACAGAC		GUCUGUGUC	UUGUCAGU
6822	GGACUGAC	CUGAUGA X GAA	AGACACAG		CUGUGUCUU	GUCAGUCC
6825	CUUGGACU	CUGAUGA X GAA	ACAAGACA		UGUCUUGUC	AGUCCAAG
6829	ACUUCUUG	CUGAUGA X GAA	ACUGACAA		UUGUCAGUC	CAAGAAGU
6851	CUAAAAUU	CUGAUGA X GAA	ACAUCUCG		CGAGAUGUU	AAUUUUAG
6852	CCUAAAAU	CUGAUGA X GAA	AACAUCUC		GAGAUGUUA	AUUUUAGG
6855	GUCCCUAA	CUGAUGA X GAA	AUUAACAU		AUGUUAAUU	UUAGGGAC
6856	GGUCCCUA	CUGAUGA X GAA	AAUUAACA		UGUUAAUUU	UAGGGACC
6857	GGGUCCCU	CUGAUGA X GAA	AAAUUAAC		GUUAAUUUU	AGGGACCC
6858	CGGGUCCC	CUGAUGA X GAA	AAAAUUAA		UUAAUUUUA	GGGACCCG
6872	UAGGAAAC	CUGAUGA X GAA	AGGCACGG		CCGUGCCUU	GUUUCCUA
6875	GGCUAGGA	CUGAUGA X GAA	ACAAGGCA		UGCCUUGUU	UCCUAGCC
6876	GGGCUAGG	CUGAUGA X GAA	AACAAGGC		GCCUUGUUU	CCUAGCCC
6877	UGGGCUAG	CUGAUGA X GAA	AAACAAGG		CCUUGUUUC	CUAGCCCA
6880	UUGUGGGC	CUGAUGA X GAA	AGGAAACA		UGUUUCCUA	GCCCACAA
6901	AUCUGUUU	CUGAUGA X GAA	AUGUUUGC		GCAAACAUC	AAACAGAU
6910	CUAGCGAG	CUGAUGA X GAA	AUCUGUUU		AAACAGAUA	CUCGCUAG
6913	AGGCUAGC	CUGAUGA X GAA	AGUAUCUG		CAGAUACUC	GCUAGCCU
6917	AAUGAGGC	CUGAUGA X GAA	AGCGAGUA		UACUCGCUA	GCCUCAUU
6922	AUUUAAAU	CUGAUGA X GAA	AGGCUAGC		GCUAGCCUC	AUUUAAAU
6925	UCAAUUUA	CUGAUGA X GAA	AUGAGGCU		AGCCUCAUU	UAAAUUGA
6926	AUCAAUUU	CUGAUGA X GAA	AAUGAGGC		GCCUCAUUU	AAAUUGAU
6927	AAUCAAUU	CUGAUGA X GAA	AAAUGAGG		CCUCAUUUA	AAUUGAUU
6931	CUUUAAUC	CUGAUGA X GAA	AUUUAAAU		AUUUAAAUU	GAUUAAAG
6935	CCUCCUUU	CUGAUGA X GAA	AUCAAUUU		AAAUUGAUU	AAAGGAGG
6936	UCCUCCUU	CUGAUGA X GAA	AAUCAAUU		AAUUGAUUA	AAGGAGGA
6951	CGGCCAAA	CUGAUGA X GAA	AUGCACUC		GAGUGCAUC	UUUGGCCG
6953	GUCGGCCA	CUGAUGA X GAA	AGAUGCAC		GUGCAUCUU	UGGCCGAC
6954	UGUCGGCC	CUGAUGA X GAA	AAGAUGCA		UGCAUCUUU	GGCCGACA
6970	CACACAGU	CUGAUGA X GAA	ACACCACU		AGUGGUGUA	ACUGUGUG

7026	AACACACA	CUGAUGA	X	GAA	ACACCCAC	GUGGGUGUA UGUGUGUU
7034	AUGCACAA	CUGAUGA	X	GAA	ACACACAU	AUGUGUGUU UUGUGCAU
7035	UAUGCACA	CUGAUGA	X	GAA	AACACACA	UGUGUGUUU UGUGCAUA
7036	UUAUGCAC	CUGAUGA	X	GAA	AAACACAC	GUGUGUUUU GUGCAUAA
7043	UAAAUAGU	CUGAUGA	X	GAA	AUGCACAA	UUGUGCAUA ACUAUUUA
7047	UCCUUAAA	CUGAUGA	X	GAA	AGUUAUGC	GCAUAACUA UUUAAGGA
7049	UUUCCUUA	CUGAUGA	X	GAA	AUAGUUAU	AUAACUAUU UAAGGAAA
7050	GUUUCCUU	CUGAUGA	X	GAA	AAUAGUUA	UAACUAUUU AAGGAAAC
7051	AGUUUCCU	CUGAUGA	X	GAA	AAAUAGUU	AACUAUUUA AGGAAACU
7065	AACUUUAA	CUGAUGA	X	GAA	AUUCCAGU	ACUGGAAUU UUAAAGUU
7066	UAACUUUA	CUGAUGA	X	GAA	AAUUCCAG	CUGGAAUUU UAAAGUUA
7067	GUAACUUU	CUGAUGA	X	GAA	AAAUUCCA	UGGAAUUUU AAAGUUAC
7068	AGUAACUU	CUGAUGA	X	GAA	AAAAUUCC	GGAAUUUUA AAGUUACU
7073	AUAAAAGU	CUGAUGA	X	GAA	ACUUUAAA	UUUAAAGUU ACUUUUAU
7074	UAUAAAAG	CUGAUGA	X	GAA	AACUUUAA	UUAAAGUUA CUUUUAUA
7077	UUGUAUAA	CUGAUGA	X	GAA	AGUAACUU	AAGUUACUU UUAUACAA
7078	UUUGUAUA	CUGAUGA	X	GAA	AAGUAACU	AGUUACUUU UAUACAAA
7079	GUUUGUAU	CUGAUGA	X	GAA	AAAGUAAC	GUUACUUUU AUACAAAC
7080	GGUUUGUA	CUGAUGA	X	GAA	AAAAGUAA	UUACUUUUA UACAAACC
7082	UUGGUUUG	CUGAUGA	X	GAA	AUAAAAGU	ACUUUUAUA CAAACCAA
7095	GUAGCAUA	CUGAUGA	X	GAA	AUUCUUGG	CCAAGAAUA UAUGCUAC
7097	CUGUAGCA	CUGAUGA	X	GAA	AUAUUCUU	AAGAAUAUA UGCUACAG
7102	UAUAUCUG	CUGAUGA	X	GAA	AGCAUAUA	UAUAUGCUA CAGAUAUA
7108	CUGUCUUA	CUGAUGA	X	GAA	AUCUGUAG	CUACAGAUA UAAGACAG
7110	GUCUGUCU	CUGAUGA	X	GAA	AUAUCUGU	ACAGAUAUA AGACAGAC
7124	UAGGACCA	CUGAUGA	X	GAA	ACCAUGUC	GACAUGGUU UGGUCCUA
7125	AUAGGACC	CUGAUGA	X	GAA	AACCAUGU	ACAUGGUUU GGUCCUAU
7129	AAAUAUAG	CUGAUGA	X	GAA	ACCAAACC	GGUUUGGUC CUAUAUUU
7132	UAGAAAUA	CUGAUGA	X	GAA	AGGACCAA	UUGGUCCUA UAUUUCUA
7134	ACUAGAAA	CUGAUGA	X	GAA	AUAGGACC	GGUCCUAUA UUUCUAGU
7136	UGACUAGA	CUGAUGA	X	GAA	AUAUAGGA	UCCUAUAUU UCUAGUCA
7137	AUGACUAG	CUGAUGA	X	GAA	AAUAUAGG	CCUAUAUUU CUAGUCAU
7138	CAUGACUA	CUGAUGA	X	GAA	AAAUAUAG	CUAUAUUUC UAGUCAUG

7140	AUCAUGAC CUGAUGA X GAA AGAAAUAU	AUAUUUCUA GUCAUGAU
7143	UUCAUCAU CUGAUGA X GAA ACUAGAAA	UUUCUAGUC AUGAUGAA
7155	AUACAAAA CUGAUGA X GAA ACAUUCAU	AUGAAUGUA UUUUGUAU
7157	GUAUACAA CUGAUGA X GAA AUACAUUC	GAAUGUAUU UUGUAUAC
7158	GGUAUACA CUGAUGA X GAA AAUACAUU	AAUGUAUUU UGUAUACC
7159	UGGUAUAC CUGAUGA X GAA AAAUACAU	AUGUAUUUU GUAUACCA
7162	AGAUGGUA CUGAUGA X GAA ACAAAAUA	UAUUUUGUA UACCAUCU
7164	GAAGAUGG CUGAUGA X GAA AUACAAAA	UUUUGUAUA CCAUCUUC
7169	UAUAUGAA CUGAUGA X GAA AUGGUAUA	UAUACCAUC UUCAUAUA
7171	AUUAUAUG CUGAUGA X GAA AGAUGGUA	UACCAUCUU CAUAUAAU
7172	UAUUAUAU CUGAUGA X GAA AAGAUGGU	ACCAUCUUC AUAUAAUA
7175	GUAUAUUA CUGAUGA X GAA AUGAAGAU	AUCUUCAUA UAAUAUAC
7177	AAGUAUAU CUGAUGA X GAA AUAUGAAG	CUUCAUAUA AUAUACUU
7180	UUUAAGUA CUGAUGA X GAA AUUAUAUG	CAUAUAAUA UACUUAAA
7182	UUUUUAAG CUGAUGA X GAA AUAUUAUA	UAUAAUAUA CUUAAAAA
7185	AUAUUUUU CUGAUGA X GAA AGUAUAUU	AAUAUACUU AAAAAUAU
7186	AAUAUUUU CUGAUGA X GAA AAGUAUAU	AUAUACUUA AAAAUAUU
7192	UUAAGAAA CUGAUGA X GAA AUUUUUAA	UUAAAAAUA UUUCUUAA
7194	AAUUAAGA CUGAUGA X GAA AUAUUUUU	AAAAAUAUU UCUUAAUU
7195	CAAUUAAG CUGAUGA X GAA AAUAUUUU	AAAAUAUUU CUUAAUUG
7196	CCAAUUAA CUGAUGA X GAA AAAUAUUU	AAAUAUUUC UUAAUUGG
7198	UCCCAAUU CUGAUGA X GAA AGAAAUAU	AUAUUUCUU AAUUGGGA
7199	AUCCCAAU CUGAUGA X GAA AAGAAAUA	UAUUUCUUA AUUGGGAU
7202	CAAAUCCC CUGAUGA X GAA AUUAAGAA	UUCUUAAUU GGGAUUUG
7208	CGAUUACA CUGAUGA X GAA AUCCCAAU	AUUGGGAUU UGUAAUCG
7209	ACGAUUAC CUGAUGA X GAA AAUCCCAA	UUGGGAUUU GUAAUCGU
7212	GGUACGAU CUGAUGA X GAA ACAAAUCC	GGAUUUGUA AUCGUACC
7215	GUUGGUAC CUGAUGA X GAA AUUACAAA	UUUGUAAUC GUACCAAC
7218	UAAGUUGG CUGAUGA X GAA ACGAUUAC	GUAAUCGUA CCAACUUA
7225	UAUCAAUU CUGAUGA X GAA AGUUGGUA	UACCAACUU AAUUGAUA
7226	UUAUCAAU CUGAUGA X GAA AAGUUGGU	ACCAACUUA AUUGAUAA
7229	AGUUUAUC CUGAUGA X GAA AUUAAGUU	AACUUAAUU GAUAAACU
7233	GCCAAGUU CUGAUGA X GAA AUCAAUUA	UAAUUGAUA AACUUGGC

7238	CAGUUGCC	CUGAUGA	X	GAA	AGUUUAUC	GAUAAACUU GGCAACUG
7249	GAACAUAA	CUGAUGA	X	GAA	AGCAGUUG	CAACUGCUU UUAUGUUC
7250	AGAACAUA	CUGAUGA	X	GAA	AAGCAGUU	AACUGCUUU UAUGUUCU
7251	CAGAACAU	CUGAUGA	X	GAA	AAAGCAGU	ACUGCUUUU AUGUUCUG
7252	ACAGAACA	CUGAUGA	X	GAA	AAAAGCAG	CUGCUUUUA UGUUCUGU
7256	GGAGACAG	CUGAUGA	X	GAA	ACAUAAAA	UUUUAUGUU CUGUCUCC
7257	AGGAGACA	CUGAUGA	X	GAA	AACAUAAA	UUUAUGUUC UGUCUCCU
7261	UGGAAGGA	CUGAUGA	X	GAA	ACAGAACA	UGUUCUGUC UCCUUCCA
7263	UAUGGAAG	CUGAUGA	X	GAA	AGACAGAA	UUCUGUCUC CUUCCAUA
7266	AUUUAUGG	CUGAUGA	X	GAA	AGGAGACA	UGUCUCCUU CCAUAAAU
7267	AAUUUAUG	CUGAUGA	X	GAA	AAGGAGAC	GUCUCCUUC CAUAAAUU
7271	GAAAAAUU	CUGAUGA	X	GAA	AUGGAAGG	CCUUCCAUA AAUUUUUC
7275	UUUUGAAA	CUGAUGA	X	GAA	AUUUAUGG	CCAUAAAUU UUUCAAAA
7276	AUUUUGAA	CUGAUGA	X	GAA	AAUUUAUG	CAUAAAUUU UUCAAAAU
7277	UAUUUUGA	CUGAUGA	X	GAA	AAAUUUAU	AUAAAUUUU UCAAAAUA
7278	GUAUUUUG	CUGAUGA	X	GAA	AAAAUUUA	UAAAUUUUU CAAAAUAC
7279	AGUAUUUU	CUGAUGA	X	GAA	AAAAAUUU	AAAUUUUUC AAAAUACU
7285	UGAAUUAG	CUGAUGA	X	GAA	AUUUUGAA	UUCAAAAUA CUAAUUCA
7288	UGUUGAAU	CUGAUGA	X	GAA	AGUAUUUU	AAAAUACUA AUUCAACA
7291	CUUUGUUG	CUGAUGA	X	GAA	AUUAGUAU	AUACUAAUU CAACAAAG
7292	UCUUUGUU	CUGAUGA	X	GAA	AAUUAGUA	UACUAAUUC AACAAAGA
7308	AAAAAAAA	CUGAUGA	X	GAA	AGCUUUUU	AAAAAGCUC UUUUUUUU
7310	GGAAAAAA	CUGAUGA	X	GAA	AGAGCUUU	AAAGCUCUU UUUUUUCC
7311	AGGAAAAA	CUGAUGA	X	GAA	AAGAGCUU	AAGCUCUUU UUUUUCCU
7312	UAGGAAAA	CUGAUGA	X	GAA	AAAGAGCU	AGCUCUUUU UUUUCCUA
7313	UUAGGAAA	CUGAUGA	X	GAA	AAAAGAGC	GCUCUUUUU UUUCCUAA
7314	UUUAGGAA	CUGAUGA	X	GAA	AAAAAGAG	CUCUUUUUU UUCCUAAA
7315	UUUUAGGA	CUGAUGA	X	GAA	AAAAAAGA	UCUUUUUUU UCCUAAAA
7316	AUUUUAGG	CUGAUGA	X	GAA	AAAAAAAG	CUUUUUUUU CCUAAAAU
7317	UAUUUUAG	CUGAUGA	X	GAA	AAAAAAAA	UUUUUUUUC CUAAAAUA
7320	GUUUAUUU	CUGAUGA	X	GAA	AGGAAAAA	UUUUUCCUA AAAUAAAC
7325	UUUGAGUU	CUGAUGA	X	GAA	AUUUUAGG	CCUAAAAUA AACUCAAA
7330	AUAAAUUU	CUGAUGA	X	GAA	AGUUUAUU	AAUAAACUC AAAUUUAU

7335	CAAGGAUA CUGAUGA X GAA AUUUGAGU	ACUCAAAUU UAUCCUUG
7336	ACAAGGAU CUGAUGA X GAA AAUUUGAG	CUCAAAUUU AUCCUUGU
7337	AACAAGGA CUGAUGA X GAA AAAUUUGA	UCAAAUUUA UCCUUGUU
7339	UAAACAAG CUGAUGA X GAA AUAAAUUU	AAAUUUAUC CUUGUUUA
7342	CUCUAAAC CUGAUGA X GAA AGGAUAAA	UUUAUCCUU GUUUAGAG
7345	CUGCUCUA CUGAUGA X GAA ACAAGGAU	AUCCUUGUU UAGAGCAG
7346	UCUGCUCU CUGAUGA X GAA AACAAGGA	UCCUUGUUU AGAGCAGA
7347	CUCUGCUC CUGAUGA X GAA AAACAAGG	CCUUGUUUA GAGCAGAG
7362	UUUUUCUU CUGAUGA X GAA AUUUUUCU	AGAAAAAUU AAGAAAAA
7363	GUUUUUCU CUGAUGA X GAA AAUUUUUC	GAAAAAUUA AGAAAAAC
7373	CCAUUUCA CUGAUGA X GAA AGUUUUUC	GAAAAACUU UGAAAUGG
7374	ACCAUUUC CUGAUGA X GAA AAGUUUUU	AAAAACUUU GAAAUGGU
7383	UUUUUUGA CUGAUGA X GAA ACCAUUUC	GAAAUGGUC UCAAAAAA
7385	AAUUUUUU CUGAUGA X GAA AGACCAUU	AAUGGUCUC AAAAAAUU
7393	UAUUUAGC CUGAUGA X GAA AUUUUUUG	CAAAAAAUU GCUAAAUA
7397	AAAAUAUU CUGAUGA X GAA AGCAAUUU	AAAUUGCUA AAUAUUUU
7401	AUUGAAAA CUGAUGA X GAA AUUUAGCA	UGCUAAAUA UUUUCAAU
7403	CCAUUGAA CUGAUGA X GAA AUAUUUAG	CUAAAUAUU UUCAAUGG
7404	UCCAUUGA CUGAUGA X GAA AAUAUUUA	UAAAUAUUU UCAAUGGA
7405	UUCCAUUG CUGAUGA X GAA AAAUAUUU	AAAUAUUUU CAAUGGAA
7406	UUUCCAUU CUGAUGA X GAA AAAAUAUU	AAUAUUUUC AAUGGAAA
7418	CUAACAUU CUGAUGA X GAA AGUUUUCC	GGAAAACUA AAUGUUAG
7424	GCUAAACU CUGAUGA X GAA ACAUUUAG	CUAAAUGUU AGUUUAGC
7425	AGCUAAAC CUGAUGA X GAA AACAUUUA	UAAAUGUUA GUUUAGCU
7428	AUCAGCUA CUGAUGA X GAA ACUAACAU	AUGUUAGUU UAGCUGAU
7429	AAUCAGCU CUGAUGA X GAA AACUAACA	UGUUAGUUU AGCUGAUU
7430	CAAUCAGC CUGAUGA X GAA AAACUAAC	GUUAGUUUA GCUGAUUG
7437	CCCCAUAC CUGAUGA X GAA AUCAGCUA	UAGCUGAUU GUAUGGGG
7440	AAACCCCA CUGAUGA X GAA ACAAUCAG	CUGAUUGUA UGGGGUUU
7447	GGUUCGAA CUGAUGA X GAA ACCCCAUA	UAUGGGGUU UUCGAACC
7448	AGGUUCGA CUGAUGA X GAA AACCCCAU	AUGGGGUUU UCGAACCU
7449	AAGGUUCG CUGAUGA X GAA AAACCCCA	UGGGGUUUU CGAACCUU
7450	AAAGGUUC CUGAUGA X GAA AAAACCCC	GGGGUUUUC GAACCUUU

7457	AAAAGUGA	CUGAUGA	X	GAA	AGGUUCGA	UCGAACCUU	UCACUUUU
7458	AAAAAGUG	CUGAUGA	X	GAA	AAGGUUCG	CGAACCUUU	CACUUUUU
7459	CAAAAAGU	CUGAUGA	X	GAA	AAAGGUUC	GAACCUUUC	ACUUUUUG
7463	CAAACAAA	CUGAUGA	X	GAA	AGUGAAAG	CUUUCACUU	UUUGUUUG
7464	ACAAACAA	CUGAUGA	X	GAA	AAGUGAAA	UUUCACUUU	UUGUUUGU
7465	AACAAACA	CUGAUGA	X	GAA	AAAGUGAA	UUCACUUUU	UGUUUGUU
7466	AAACAAAC	CUGAUGA	X	GAA	AAAAGUGA	UCACUUUUU	GUUUGUUU
7469	GUAAAACA	CUGAUGA	X	GAA	ACAAAAAG	CUUUUUGUU	UGUUUUAC
7470	GGUAAAAC	CUGAUGA	X	GAA	AACAAAAA	UUUUUGUUU	GUUUUACC
7473	AUAGGUAA	CUGAUGA	X	GAA	ACAAACAA	UUGUUUGUU	UUACCUAU
7474	AAUAGGUA	CUGAUGA	X	GAA	AACAAACA	UGUUUGUUU	UACCUAUU
7475	AAAUAGGU	CUGAUGA	X	GAA	AAACAAAC	GUUUGUUUU	ACCUAUUU
7476	GAAAUAGG	CUGAUGA	X	GAA	AAAACAAA	UUUGUUUUA	CCUAUUUC
7480	UUGUGAAA	CUGAUGA	X	GAA	AGGUAAAA	UUUUACCUA	UUUCACAA
7482	AGUUGUGA	CUGAUGA	X	GAA	AUAGGUAA	UUACCUAUU	UCACAACU
7483	CAGUUGUG	CUGAUGA	X	GAA	AAUAGGUA	UACCUAUUU	CACAACUG
7484	ACAGUUGU	CUGAUGA	X	GAA	AAAUAGGU	ACCUAUUUC	ACAACUGU
7495	UGGCAAUU	CUGAUGA	X	GAA	ACACAGUU	AACUGUGUA	AAUUGCCA
7499	UUAUUGGC	CUGAUGA	X	GAA	AUUUACAC	GUGUAAAUU	GCCAAUAA
7506	ACAGGAAU	CUGAUGA	X	GAA	AUUGGCAA	UUGCCAAUA	AUUCCUGU
7509	UGGACAGG	CUGAUGA	X	GAA	AUUAUUGG	CCAAUAAUU	CCUGUCCA
7510	AUGGACAG	CUGAUGA	X	GAA	AAUUAUUG	CAAUAAUUC	CUGUCCAU
7515	UUUUCAUG	CUGAUGA	X	GAA	ACAGGAAU	AUUCCUGUC	CAUGAAAA
7531	CACUGGAU	CUGAUGA	X	GAA	AUUUGCAU	AUGCAAAUU	AUCCAGUG
7532	ACACUGGA	CUGAUGA	X	GAA	AAUUUGCA	UGCAAAUUA	UCCAGUGU
7534	CUACACUG	CUGAUGA	X	GAA	AUAAUUUG	CAAAUUAUC	CAGUGUAG
7541	AAUAUAUC	CUGAUGA	X	GAA	ACACUGGA	UCCAGUGUA	GAUAUAUU
7545	GUCAAAUA	CUGAUGA	X	GAA	AUCUACAC	GUGUAGAUA	UAUUUGAC
7547	UGGUCAAA	CUGAUGA	X	GAA	AUAUCUAC	GUAGAUAUA	UUUGACCA
7549	GAUGGUCA	CUGAUGA	X	GAA	AUAUAUCU	AGAUAUAUU	UGACCAUC
7550	UGAUGGUC	CUGAUGA	X	GAA	AAUAUAUC	GAUAUAUUU	GACCAUCA
7557	CAUAGGGU	CUGAUGA	X	GAA	AUGGUCAA	UUGACCAUC	ACCCUAUG
7563	AAUAUCCA	CUGAUGA	X	GAA	AGGGUGAU	AUCACCCUA	UGGAUAUU

7569	CUAGCCAA	CUGAUGA	X	GAA	AUCCAUAG	CUAUGGAUA	UUGGCUAG
7571	AACUAGCC	CUGAUGA	X	GAA	AUAUCCAU	AUGGAUAUU	GGCUAGUU
7576	GGCAAAAC	CUGAUGA	X	GAA	AGCCAAUA	UAUUGGCUA	GUUUUGCC
7579	AAAGGCAA	CUGAUGA	X	GAA	ACUAGCCA	UGGCUAGUU	UUGCCUUU
7580	UAAAGGCA	CUGAUGA	X	GAA	AACUAGCC	GGCUAGUUU	UGCCUUUA
7581	AUAAAGGC	CUGAUGA	X	GAA	AAACUAGC	GCUAGUUUU	GCCUUUAU
7586	GCUUAAUA	CUGAUGA	X	GAA	AGGCAAAA	UUUUGCCUU	UAUUAAGC
7587	UGCUUAAU	CUGAUGA	X	GAA	AAGGCAAA	UUUGCCUUU	AUUAAGCA
7588	UUGCUUAA	CUGAUGA	X	GAA	AAAGGCAA	UUGCCUUUA	UUAAGCAA
7590	AUUUGCUU	CUGAUGA	X	GAA	AUAAAGGC	GCCUUUAUU	AAGCAAAU
7591	AAUUUGCU	CUGAUGA	X	GAA	AAUAAAGG	CCUUUAUUA	AGCAAAUU
7599	CUGAAAUG	CUGAUGA	X	GAA	AUUUGCUU	AAGCAAAUU	CAUUUCAG
7600	GCUGAAAU	CUGAUGA	X	GAA	AAUUUGCU	AGCAAAUUC	AUUUCAGC
7603	CAGGCUGA	CUGAUGA	X	GAA	AUGAAUUU	AAAUUCAUU	UCAGCCUG
7604	UCAGGCUG	CUGAUGA	X	GAA	AAUGAAUU	AAUUCAUUU	CAGCCUGA
7605	UUCAGGCU	CUGAUGA	X	GAA	AAAUGAAU	AUUCAUUUC	AGCCUGAA
7617	UAUAGGCA	CUGAUGA	X	GAA	ACAUUCAG	CUGAAUGUC	UGCCUAUA
7623	AGAAUAUA	CUGAUGA	X	GAA	AGGCAGAC	GUCUGCCUA	UAUAUUCU
7625	AGAGAAUA	CUGAUGA	X	GAA	AUAGGCAG	CUGCCUAUA	UAUUCUCU
7627	GCAGAGAA	CUGAUGA	X	GAA	AUAUAGGC	GCCUAUAUA	UUCUCUGC
7629	GAGCAGAG	CUGAUGA	X	GAA	AUAUAUAG	CUAUAUAUU	CUCUGCUC
7630	AGAGCAGA	CUGAUGA	X	GAA	AAUAUAUA	UAUAUAUUC	UCUGCUCU
7632	AAAGAGCA	CUGAUGA	X	GAA	AGAAUAUA	UAUAUUCUC	UGCUCUUU
7637	AAUACAAA	CUGAUGA	X	GAA	AGCAGAGA	UCUCUGCUC	UUUGUAUU
7639	AGAAUACA	CUGAUGA	X	GAA	AGAGCAGA	UCUGCUCUU	UGUAUUCU
7640	GAGAAUAC	CUGAUGA	X	GAA	AAGAGCAG	CUGCUCUUU	GUAUUCUC
7643	AAGGAGAA	CUGAUGA	X	GAA	ACAAAGAG	CUCUUUGUA	UUCUCCUU
7645	CAAAGGAG	CUGAUGA	X	GAA	AUACAAAG	CUUUGUAUU	CUCCUUUG
7646	UCAAAGGA	CUGAUGA	X	GAA	AAUACAAA	UUUGUAUUC	UCCUUUGA
7648	GUUCAAAG	CUGAUGA	X	GAA	AGAAUACA	UGUAUUCUC	CUUUGAAC
7651	CGGGUUCA	CUGAUGA	X	GAA	AGGAGAAU	AUUCUCCUU	UGAACCCG
7652	ACGGGUUC	CUGAUGA	X	GAA	AAGGAGAA	UUCUCCUUU	GAACCCGU
7661	GAUGUUUU	CUGAUGA	X	GAA	ACGGGUUC	GAACCCGUU	AAAACAUC

7662	GGAUGUUU	CUGAUGA	X	GAA	AACGGGUU	AACCCGUUA	AAACAUCC
7669	UGCCACAG	CUGAUGA	X	GAA	AUGUUUUA	UAAAACAUC	CUGUGGCA

Where "X" represents stem II region of a HH ribozyme (Hertel et al., 1992 *Nucleic Acids Res.* 20 3252). The length of stem II may be ≥ 2 base-pairs.

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Table III: Human *flt1* VEGF Receptor-Hairpin Ribozyme and Substrate Sequence

nt. Position	HP Ribozyme Sequence	Substrate
16	CGGGGAGG AGAA GAGAGG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCUCUCG GCU CCUCCCCG
39	CCGCUCCG AGAA GCCGCC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGCGGCG GCU CGGAGCGG
180	CCGCCAGA AGAA GUCCUC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAGGACG GAC UCUGGCGG
190	AACGACCC AGAA GCCAGA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCUGGCG GCC GGGUCGUU
278	GCGCGCAC AGAA GGACCC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGGUCCU GCU GUGCGCGC
290	GACAGCUG AGAA GCGCGC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCGCGCU GCU CAGCUGUC
295	AAGCAGAC AGAA GAGCAG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUGCUCA GCU GUCUGCUU
298	GAGAAGCA AGAA GCUGAG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUCAGCU GUC UGCUUCUC
302	CUGUGAGA AGAA GACAGC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCUGUCU GCU UCUCACAG
420	CAUUUAUG AGAA GCUUCC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGAAGCA GCC CAUAAAUG
486	CUUCCACA AGAA GAUUUA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UAAAUCU GCC UGUGGAAG
537	UUUGCUUG AGAA GUGUUC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAACACA GCU CAAGCAAA
565	AUAUUUGC AGAA GUAGAA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUCUACA GCU GCAAAUAU
721	CGUAACCC AGAA GGGAAU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AUUCCCU GCC GGGUUACG
786	CGUUUUCC AGAA GGGAUC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAUCCCU GAU GGAAAACG
863	CUUCACAG AGAA GAAGCC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGCUUCU GAC CUGUGAAG

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1056	UUUUUUUC	AGAA	GGGUAA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUACCCU	GAU	GAAAAAAA
1301	GCCGGUAA	AGAA	GCUUGC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCAAGCG	GUC	UUACCGGC
1310	UCAUAGAG	AGAA	GGUAAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUUACCG	GCU	CUCUAUGA
1389	AAAUAGCG	AGAA	GAUUUC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAAAUCU	GCU	CGCUAUUU
1535	UUUCGUAA	AGAA	GGGGUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AACCCCA	GAU	UUACGAAA
1566	AGAGCCGG	AGAA	GGAAAC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GUUUCCA	GAC	CCGGCUCU
1572	GGGUAGAG	AGAA	GGGUCU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGACCCG	GCU	CUCUACCC
1604	CGGUACAA	AGAA	GGAUUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAAUCCU	GAC	UUGUACCG
1824	AUUCUAGA	AGAA	GCCACA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGUGGCU	GAC	UCUAGAAU
1908	UUUGGCAC	AGAA	GUGAUA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UAUCACA	GAU	GUGCCAAA
1949	CUCCUUCC	AGAA	GCAUUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAAUGCC	GAC	GGAAGGAG
1973	CUGUGCAA	AGAA	GUUUCA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGAAACU	GUC	UUGCACAG
2275	AGUGGUGG	AGAA	GCUGAU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AUCAGCA	GUU	CCACCACU
2321	ACCAAGUG	AGAA	GAGGCU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGCCUCA	GAU	CACUUGGU
2396	UUUCAAUA	AGAA	GCGUGC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCACGCU	GUU	UAUUGAAA
2490	GUUCCUUG	AGAA	GUGAGG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCUCACU	GUU	CAAGGAAC
2525	UUAGAGUG	AGAA	GCUCCA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGGAGCU	GAU	CACUCUAA
2625	GAUAGGUA	AGAA	GUCUUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAAGACU	GAC	UACCUAUC
2652	GGAACUUC	AGAA	GGGUCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGACCCA	GAU	GAAGUUCC

2684	CAUAAGGG	AGAA	GCUCAC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GUGAGCG	GCU	CCCUUAUG
2816	CAGCCACA	AGAA	GGCACG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CGUGCCG	GAC	UGUGGCUG
2873	GCUCAGUC	AGAA	GAGCUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAGCUCU	GAU	GACUGAGC
2930	AGGCUCCC	AGAA	GGUUAA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUAACCU	GCU	GGGAGCCU
2963	CAAUCACC	AGAA	GAGGCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGCCUCU	GAU	GGUGAUUG
3157	UUCCUGAA	AGAA	GGAGCU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGCUCCG	GCU	UUCAGGAA
3207	UAGAAACC	AGAA	GAAUCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGAUUCU	GAC	GGUUUCUA
3211	CUUGUAGA	AGAA	GUCAGA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCUGACG	GUU	UCUACAAG
3245	UGUAAGAA	AGAA	GAUCUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAGAUCU	GAU	UUCUUACA
3256	CACUUGAA	AGAA	GUAAGA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCUUACA	GUU	UUCAAGUG
3287	UUCUGGAA	AGAA	GGAACU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGUUCCU	GUC	UUCCAGAA
3402	CUCACAUA	AGAA	GGGUUC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAACCCC	GAU	UAUGUGAG
3580	CCUCAGGC	AGAA	GCAAAA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUUUGCA	GUC	GCCUGAGG
3641	CCAGCAUG	AGAA	GAUAGA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCUAUCA	GAU	CAUGCUGG
3655	UCUGUGCC	AGAA	GUCCAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUGGACU	GCU	GGCACAGA
3810	UCAGAGAA	AGAA	GGAGUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AACUCCU	GCC	UUCUCUGA
3846	AACUUCGG	AGAA	GAAAUA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UAUUUCA	GCU	CCGAAGUU
3873	CUGACAUC	AGAA	GAGCUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAGCUCU	GAU	GAUGUCAG
3995	GAGAGGCC	AGAA	GAGUGC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCACUCU	GUU	GGCCUCUC

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4100	UGACAUCA	AGAA	GCCCCG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CGGGGCU	GUC	UGAUGUCA
4104	CUGCUGAC	AGAA	GACAGC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCUGUCU	GAU	GUCAGCAG
4120	AUGGCAGA	AGAA	GGGCCU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGGCCCA	GUU	UCUGCCAU
4135	GUGCCCAC	AGAA	GGAAUG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CAUUCCA	GCU	GUGGGCAC
4210	GGGCGGGG	AGAA	GCACGC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCGUGCU	GCU	CCCCGCCC
4217	AGUCUGGG	AGAA	GGGAGC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCUCCCC	GCC	CCCAGACU
4224	GAGUUGUA	AGAA	GGGGGC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCCCCCA	GAC	UACAACUC
4382	CAAAAAGC	AGAA	GGCUCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGAGCCA	GCU	GCUUUUUG
4385	UCACAAAA	AGAA	GCUGGC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCCAGCU	GCU	UUUUGUGA
4537	GGGGUUGG	AGAA	GGGAAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUUCCCU	GCU	CCAACCCC
4573	CUCAAUCA	AGAA	GGUCCU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGGACCA	GUU	UGAUUGAG
4594	AUUGGGUG	AGAA	GUGCAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUGCACU	GAU	CACCCAAU
4628	GGCUGCAG	AGAA	GGCCCA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGGGCCA	GCC	CUGCAGCC
4636	GGGUUUUG	AGAA	GCAGGG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCCUGCA	GCC	CAAAACCC
4866	AGGGUCAG	AGAA	GGGAAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUUCCCA	GCU	CUGACCCU
4871	GUAGAAGG	AGAA	GAGCUG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CAGCUCU	GAC	CCUUCUAC
4905	CGCUGUCC	AGAA	GCUCCU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGGAGCA	GAU	GGACAGCG
5233	CUGUGCAA	AGAA	GAAUAA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUAUUCU	GUU	UUGCACAG
5281	CUCCUCAG	AGAA	GCAUUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAAUGCA	GUC	CUGAGGAG

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5319	UUUCCUCC	AGAA	GCCCUC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAGGGCU	GAU	GGAGGAAA
5358	GGUAUAGA	AGAA	GGGUCU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGACCCC	GUC	UCUAUACC
5392	UGGGUCCC	AGAA	GUGUUG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CAACACA	GUU	GGGACCCA
5563	UGAGUCCC	AGAA	GGAGAA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUCUCCA	GUU	GGGACUCA
5622	AGUUUCAA	AGAA	GUUGAA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUCAACU	GCU	UUGAAACU
5738	UAGCAUCA	AGAA	GAGCCA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGGCUCU	GUU	UGAUGCUA
5838	UAGCAUCA	AGAA	GAGCCA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGGCUCU	GUU	UGAUGCUA
5933	CCCCAAGA	AGAA	GCAAUC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAUUGCU	GCU	UCUUGGGG
6022	CACAUAAG	AGAA	GAGGCA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGCCUCU	GUU	CUUAUGUG
6120	UCCACAAA	AGAA	GCUGCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGCAGCG	GCU	UUUGUGGA
6163	GUGGAGAG	AGAA	GUCCCA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGGGACA	GUC	CUCUCCAC
6270	AAAUUGCC	AGAA	GUCACA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGUGACA	GCU	GGCAAUUU
6412	AAGACAUG	AGAA	GCUAAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUUAGCU	GUU	CAUGUCUU
6511	UUUGAAGG	AGAA	GAGUAA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUACUCA	GCU	CCUUCAAA
6778	UCCACCCA	AGAA	GUUCCA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGGAACA	GUC	UGGGUGGA
6826	ACUUCUUG	AGAA	GACAAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUUGUCA	GUC	CAAGAAGU
7245	AACAUAAA	AGAA	GUUGCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGCAACU	GCU	UUUAUGUU
7258	UGGAAGGA	AGAA	GAACAU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AUGUUCU	GUC	UCCUUCCA
7433	CCCAUACA	AGAA	GCUAAA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUUAGCU	GAU	UGUAUGGG

96

7512	UUUUCAUG AGAA GGAAUU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAUUCCU GUC CAUGAAAA
7606	GACAUUCA AGAA GAAAUG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CAUUUCA GCC UGAAUGUC
7618	AAUAUAUA AGAA GACAUU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAUGUCU GCC UAUAUAUU
7633	AUACAAAG AGAA GAGAAU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AUUCUCU GCU CUUUGUAU

Table IV: Human KDR VEGF Receptor-Hammerhead Ribozyme and Substrate Sequence

nt. Position	HH Ribozyme Sequence	Substrate
21	CACAGGGC CUGAUGA X GAA ACGGCCAG	CUGGCCGUC GCCCUGUG
33	UCCACGCA CUGAUGA X GAA AGCCACAG	CUGUGGCUC UGCGUGGA
56	AACCCACA CUGAUGA X GAA AGGCGGCC	GGCCGCCUC UGUGGGUU
64	ACUAGGCA CUGAUGA X GAA ACCCACAG	CUGUGGGUU UGCCUAGU
65	CACUAGGC CUGAUGA X GAA AACCCACA	UGUGGGUUU GCCUAGUG
70	AGAAACAC CUGAUGA X GAA AGGCAAAC	GUUUGCCUA GUGUUUCU
75	UCAAGAGA CUGAUGA X GAA ACACUAGG	CCUAGUGUU UCUCUUGA
76	AUCAAGAG CUGAUGA X GAA AACACUAG	CUAGUGUUU CUCUUGAU
77	GAUCAAGA CUGAUGA X GAA AAACACUA	UAGUGUUUC UCUUGAUC
79	CAGAUCAA CUGAUGA X GAA AGAAACAC	GUGUUUCUC UUGAUCUG
81	GGCAGAUC CUGAUGA X GAA AGAGAAAC	GUUUCUCUU GAUCUGCC
85	CCUGGGCA CUGAUGA X GAA AUCAAGAG	CUCUUGAUC UGCCCAGG
96	UGUAUGCU CUGAUGA X GAA AGCCUGGG	CCCAGGCUC AGCAUACA
102	UCUUUUUG CUGAUGA X GAA AUGCUGAG	CUCAGCAUA CAAAAAGA
114	AUUGUAAG CUGAUGA X GAA AUGUCUUU	AAAGACAUA CUUACAAU
117	UUAAUUGU CUGAUGA X GAA AGUAUGUC	GACAUACUU ACAAUUAA
118	CUUAAUUG CUGAUGA X GAA AAGUAUGU	ACAUACUUA CAAUUAAG
123	UUAGCCUU CUGAUGA X GAA AUUGUAAG	CUUACAAUU AAGGCUAA
124	AUUAGCCU CUGAUGA X GAA AAUUGUAA	UUACAAUUA AGGCUAAU
130	AGUUGUAU CUGAUGA X GAA AGCCUUAA	UUAAGGCUA AUACAACU
133	AAGAGUUG CUGAUGA X GAA AUUAGCCU	AGGCUAAUA CAACUCUU
139	AAUUUGAA CUGAUGA X GAA AGUUGUAU	AUACAACUC UUCAAAUU
141	GUAAUUUG CUGAUGA X GAA AGAGUUGU	ACAACUCUU CAAAUUAC
142	AGUAAUUU CUGAUGA X GAA AAGAGUUG	CAACUCUUC AAAUUACU
147	CUGCAAGU CUGAUGA X GAA AUUUGAAG	CUUCAAAUU ACUUGCAG
148	CCUGCAAG CUGAUGA X GAA AAUUUGAA	UUCAAAUUA CUUGCAGG
151	UCCCCUGC CUGAUGA X GAA AGUAAUUU	AAAUUACUU GCAGGGGA

170	GCCAGUCC CUGAUGA X GAA AGUCCCUC	GAGGGACUU GGACUGGC
180	UUGGGCCA CUGAUGA X GAA AGCCAGUC	GACUGGCUU UGGCCCAA
181	AUUGGGCC CUGAUGA X GAA AAGCCAGU	ACUGGCUUU GGCCCAAU
190	ACUCUGAU CUGAUGA X GAA AUUGGGCC	GGCCCAAUA AUCAGAGU
193	GCCACUCU CUGAUGA X GAA AUUAUUGG	CCAAUAAUC AGAGUGGC
243	UUACAGAA CUGAUGA X GAA AGGCCAUC	GAUGGCCUC UUCUGUAA
245	UCUUACAG CUGAUGA X GAA AGAGGCCA	UGGCCUCUU CUGUAAGA
246	GUCUUACA CUGAUGA X GAA AAGAGGCC	GGCCUCUUC UGUAAGAC
250	GAGUGUCU CUGAUGA X GAA ACAGAAGA	UCUUCUGUA AGACACUC
258	GGAAUUGU CUGAUGA X GAA AGUGUCUU	AAGACACUC ACAAUUCC
264	ACUUUUGG CUGAUGA X GAA AUUGUGAG	CUCACAAUU CCAAAAGU
265	CACUUUUG CUGAUGA X GAA AAUUGUGA	UCACAAUUC CAAAAGUG
276	UCAUUUCC CUGAUGA X GAA AUCACUUU	AAAGUGAUC GGAAAUGA
296	AGCACUUG CUGAUGA X GAA AGGCUCCA	UGGAGCCUA CAAGUGCU
305	CCCGGUAG CUGAUGA X GAA AGCACUUG	CAAGUGCUU CUACCGGG
306	UCCCGGUA CUGAUGA X GAA AAGCACUU	AAGUGCUUC UACCGGGA
308	UUUCCCGG CUGAUGA X GAA AGAAGCAC	GUGCUUCUA CCGGGAAA
323	CCGAGGCC CUGAUGA X GAA AGUCAGUU	AACUGACUU GGCCUCGG
329	AAAUGACC CUGAUGA X GAA AGGCCAAG	CUUGGCCUC GGUCAUUU
333	ACAUAAAU CUGAUGA X GAA ACCGAGGC	GCCUCGGUC AUUUAUGU
336	UAGACAUA CUGAUGA X GAA AUGACCGA	UCGGUCAUU UAUGUCUA
337	AUAGACAU CUGAUGA X GAA AAUGACCG	CGGUCAUUU AUGUCUAU
338	CAUAGACA CUGAUGA X GAA AAAUGACC	GGUCAUUUA UGUCUAUG
342	UGAACAUA CUGAUGA X GAA ACAUAAAU	AUUUAUGUC UAUGUUCA
344	CUUGAACA CUGAUGA X GAA AGACAUAA	UUAUGUCUA UGUUCAAG
348	UAAUCUUG CUGAUGA X GAA ACAUAGAC	GUCUAUGUU CAAGAUUA
349	GUAAUCUU CUGAUGA X GAA AACAUAGA	UCUAUGUUC AAGAUUAC
355	AGAUCUGU CUGAUGA X GAA AUCUUGAA	UUCAAGAUU ACAGAUCU
356	GAGAUCUG CUGAUGA X GAA AAUCUUGA	UCAAGAUUA CAGAUCUC
362	UAAAUGGA CUGAUGA X GAA AUCUGUAA	UUACAGAUC UCCAUUUA
364	AAUAAAUG CUGAUGA X GAA AGAUCUGU	ACAGAUCUC CAUUUAUU
368	AAGCAAUA CUGAUGA X GAA AUGGAGAU	AUCUCCAUU UAUUGCUU
369	GAAGCAAU CUGAUGA X GAA AAUGGAGA	UCUCCAUUU AUUGCUUC

370	AGAAGCAA CUGAUGA X GAA AAAUGGAG	CUCCAUUUA UUGCUUCU
372	ACAGAAGC CUGAUGA X GAA AUAAAUGG	CCAUUUAUU GCUUCUGU
376	ACUAACAG CUGAUGA X GAA AGCAAUAA	UUAUUGCUU CUGUUAGU
377	CACUAACA CUGAUGA X GAA AAGCAAUA	UAUUGCUUC UGUUAGUG
381	UGGUCACU CUGAUGA X GAA ACAGAAGC	GCUUCUGUU AGUGACCA
382	UUGGUCAC CUGAUGA X GAA AACAGAAG	CUUCUGUUA GUGACCAA
399	AUGUACAC CUGAUGA X GAA ACUCCAUG	CAUGGAGUC GUGUACAU
404	CAGUAAUG CUGAUGA X GAA ACACGACU	AGUCGUGUA CAUUACUG
408	UUCUCAGU CUGAUGA X GAA AUGUACAC	GUGUACAUU ACUGAGAA
409	GUUCUCAG CUGAUGA X GAA AAUGUACA	UGUACAUUA CUGAGAAC
438	AGACAUGG CUGAUGA X GAA AUCACCAC	GUGGUGAUU CCAUGUCU
439	GAGACAUG CUGAUGA X GAA AAUCACCA	UGGUGAUUC CAUGUCUC
445	GGACCCGA CUGAUGA X GAA ACAUGGAA	UUCCAUGUC UCGGGUCC
447	AUGGACCC CUGAUGA X GAA AGACAUGG	CCAUGUCUC GGGUCCAU
452	UUGAAAUG CUGAUGA X GAA ACCCGAGA	UCUCGGGUC CAUUUCAA
456	AGAUUUGA CUGAUGA X GAA AUGGACCC	GGGUCCAUU UCAAAUCU
457	GAGAUUUG CUGAUGA X GAA AAUGGACC	GGUCCAUUU CAAAUCUC
458	UGAGAUUU CUGAUGA X GAA AAAUGGAC	GUCCAUUUC AAAUCUCA
463	CACGUUGA CUGAUGA X GAA AUUUGAAA	UUUCAAAUC UCAACGUG
465	GACACGUU CUGAUGA X GAA AGAUUUGA	UCAAAUCUC AACGUGUC
473	CACAAAGU CUGAUGA X GAA ACACGUUG	CAACGUGUC ACUUUGUG
477	CUUGCACA CUGAUGA X GAA AGUGACAC	GUGUCACUU UGUGCAAG
478	UCUUGCAC CUGAUGA X GAA AAGUGACA	UGUCACUUU GUGCAAGA
488	UUUCUGGG CUGAUGA X GAA AUCUUGCA	UGCAAGAUA CCCAGAAA
503	CAGGAACA CUGAUGA X GAA AUCUCUUU	AAAGAGAUU UGUUCCUG
504	UCAGGAAC CUGAUGA X GAA AAUCUCUU	AAGAGAUUU GUUCCUGA
507	CCAUCAGG CUGAUGA X GAA ACAAAUCU	AGAUUUGUU CCUGAUGG
508	ACCAUCAG CUGAUGA X GAA AACAAAUC	GAUUUGUUC CUGAUGGU
517	AAUUCUGU CUGAUGA X GAA ACCAUCAG	CUGAUGGUA ACAGAAUU
525	UCCCAGGA CUGAUGA X GAA AUUCUGUU	AACAGAAUU UCCUGGGA
526	GUCCCAGG CUGAUGA X GAA AAUUCUGU	ACAGAAUUU CCUGGGAC
527	UGUCCCAG CUGAUGA X GAA AAAUUCUG	CAGAAUUUC CUGGGACA
548	GAAUAGUA CUGAUGA X GAA AGCCCUUC	GAAGGGCUU UACUAUUC

549	GGAAUAGU CUGAUGA X GAA AAGCCCUU	AAGGGCUUU ACUAUUCC
550	GGGAAUAG CUGAUGA X GAA AAAGCCCU	AGGGCUUUA CUAUUCCC
553	GCUGGGAA CUGAUGA X GAA AGUAAAGC	GCUUUACUA UUCCCAGC
555	UAGCUGGG CUGAUGA X GAA AUAGUAAA	UUUACUAUU CCCAGCUA
556	GUAGCUGG CUGAUGA X GAA AAUAGUAA	UUACUAUUC CCAGCUAC
563	UGAUCAUG CUGAUGA X GAA AGCUGGGA	UCCCAGCUA CAUGAUCA
570	GCAUAGCU CUGAUGA X GAA AUCAUGUA	UACAUGAUC AGCUAUGC
575	UGCCAGCA CUGAUGA X GAA AGCUGAUC	GAUCAGCUA UGCUGGCA
588	UCACAGAA CUGAUGA X GAA ACCAUGCC	GGCAUGGUC UUCUGUGA
590	CUUCACAG CUGAUGA X GAA AGACCAUG	CAUGGUCUU CUGUGAAG
591	GCUUCACA CUGAUGA X GAA AAGACCAU	AUGGUCUUC UGUGAAGC
606	UCAUCAUU CUGAUGA X GAA AUUUUUGC	GCAAAAAUU AAUGAUGA
607	UUCAUCAU CUGAUGA X GAA AAUUUUUG	CAAAAAUUA AUGAUGAA
619	AGACUGGU CUGAUGA X GAA ACUUUCAU	AUGAAAGUU ACCAGUCU
620	UAGACUGG CUGAUGA X GAA AACUUUCA	UGAAAGUUA CCAGUCUA
626	ACAUAAUA CUGAUGA X GAA ACUGGUAA	UUACCAGUC UAUUAUGU
628	GUACAUAA CUGAUGA X GAA AGACUGGU	ACCAGUCUA UUAUGUAC
630	AUGUACAU CUGAUGA X GAA AUAGACUG	CAGUCUAUU AUGUACAU
631	UAUGUACA CUGAUGA X GAA AAUAGACU	AGUCUAUUA UGUACAUA
635	CAACUAUG CUGAUGA X GAA ACAUAAUA	UAUUAUGUA CAUAGUUG
639	ACGACAAC CUGAUGA X GAA AUGUACAU	AUGUACAUA GUUGUCGU
642	ACAACGAC CUGAUGA X GAA ACUAUGUA	UACAUAGUU GUCGUUGU
645	CCUACAAC CUGAUGA X GAA ACAACUAU	AUAGUUGUC GUUGUAGG
648	UACCCUAC CUGAUGA X GAA ACGACAAC	GUUGUCGUU GUAGGGUA
651	CUAUACCC CUGAUGA X GAA ACAACGAC	GUCGUUGUA GGGUAUAG
656	AAAUCCUA CUGAUGA X GAA ACCCUACA	UGUAGGGUA UAGGAUUU
658	AUAAAUCC CUGAUGA X GAA AUACCCUA	UAGGGUAUA GGAUUUAU
663	ACAUCAUA CUGAUGA X GAA AUCCUAUA	UAUAGGAUU UAUGAUGU
664	CACAUCAU CUGAUGA X GAA AAUCCUAU	AUAGGAUUU AUGAUGUG
665	CCACAUCA CUGAUGA X GAA AAAUCCUA	UAGGAUUUA UGAUGUGG
675	GGACUCAG CUGAUGA X GAA ACCACAUC	GAUGUGGUU CUGAGUCC
676	CGGACUCA CUGAUGA X GAA AACCACAU	AUGUGGUUC UGAGUCCG
682	AUGAGACG CUGAUGA X GAA ACUCAGAA	UUCUGAGUC CGUCUCAU

686	UUCCAUGA	CUGAUGA X GAA	ACGGACUC		GAGUCCGUC	UCAUGGAA
688	AAUUCCAU	CUGAUGA X GAA	AGACGGAC		GUCCGUCUC	AUGGAAUU
696	GAUAGUUC	CUGAUGA X GAA	AUUCCAUG		CAUGGAAUU	GAACUAUC
702	CCAACAGA	CUGAUGA X GAA	AGUUCAAU		AUUGAACUA	UCUGUUGG
704	CUCCAACA	CUGAUGA X GAA	AUAGUUCA		UGAACUAUC	UGUUGGAG
708	UUUUCUCC	CUGAUGA X GAA	ACAGAUAG		CUAUCUGUU	GGAGAAAA
720	UUUAAGAC	CUGAUGA X GAA	AGCUUUUC		GAAAAGCUU	GUCUUAAA
723	CAAUUUAA	CUGAUGA X GAA	ACAAGCUU		AAGCUUGUC	UUAAAUUG
725	UACAAUUU	CUGAUGA X GAA	AGACAAGC		GCUUGUCUU	AAAUUGUA
726	GUACAAUU	CUGAUGA X GAA	AAGACAAG		CUUGUCUUA	AAUUGUAC
730	UGCUGUAC	CUGAUGA X GAA	AUUUAAGA		UCUUAAAUU	GUACAGCA
733	UCUUGCUG	CUGAUGA X GAA	ACAAUUUA		UAAAUUGUA	CAGCAAGA
750	CCCACAUU	CUGAUGA X GAA	AGUUCAGU		ACUGAACUA	AAUGUGGG
762	UUGAAGUC	CUGAUGA X GAA	AUCCCCAC		GUGGGGAUU	GACUUCAA
767	CCCAGUUG	CUGAUGA X GAA	AGUCAAUC		GAUUGACUU	CAACUGGG
768	UCCCAGUU	CUGAUGA X GAA	AAGUCAAU		AUUGACUUC	AACUGGGA
779	AAGAAGGG	CUGAUGA X GAA	AUUCCCAG		CUGGGAAUA	CCCUUCUU
784	CUUCGAAG	CUGAUGA X GAA	AGGGUAUU		AAUACCCUU	CUUCGAAG
785	GCUUCGAA	CUGAUGA X GAA	AAGGGUAU		AUACCCUUC	UUCGAAGC
787	AUGCUUCG	CUGAUGA X GAA	AGAAGGGU		ACCCUUCUU	CGAAGCAU
788	GAUGCUUC	CUGAUGA X GAA	AAGAAGGG		CCCUUCUUC	GAAGCAUC
796	CUUAUGCU	CUGAUGA X GAA	AUGCUUCG		CGAAGCAUC	AGCAUAAG
802	AAGUUUCU	CUGAUGA X GAA	AUGCUGAU		AUCAGCAUA	AGAAACUU
810	CGGUUUAC	CUGAUGA X GAA	AGUUUCUU		AAGAAACUU	GUAAACCG
813	UCUCGGUU	CUGAUGA X GAA	ACAAGUUU		AAACUUGUA	AACCGAGA
825	UGGGUUUU	CUGAUGA X GAA	AGGUCUCG		CGAGACCUA	AAAACCCA
836	CACUCCCA	CUGAUGA X GAA	ACUGGGUU		AACCCAGUC	UGGGAGUG
857	UGCUCAAA	CUGAUGA X GAA	AUUUCUUC		GAAGAAAUU	UUUGAGCA
858	GUGCUCAA	CUGAUGA X GAA	AAUUUCUU		AAGAAAUUU	UUGAGCAC
859	GGUGCUCA	CUGAUGA X GAA	AAAUUUCU		AGAAAUUUU	UGAGCACC
860	AGGUGCUC	CUGAUGA X GAA	AAAAUUUC		GAAAUUUUU	GAGCACCU
869	CUAUAGUU	CUGAUGA X GAA	AGGUGCUC		GAGCACCUU	AACUAUAG
870	UCUAUAGU	CUGAUGA X GAA	AAGGUGCU		AGCACCUUA	ACUAUAGA

874	ACCAUCUA	CUGAUGA	X	GAA	AGUUAAGG	CCUUAACUA	UAGAUGGU
876	ACACCAUC	CUGAUGA	X	GAA	AUAGUUAA	UUAACUAUA	GAUGGUGU
885	CUCCGGGU	CUGAUGA	X	GAA	ACACCAUC	GAUGGUGUA	ACCCGGAG
905	AGGUGUAC	CUGAUGA	X	GAA	AUCCUUGG	CCAAGGAUU	GUACACCU
908	CACAGGUG	CUGAUGA	X	GAA	ACAAUCCU	AGGAUUGUA	CACCUGUG
923	GCCCACUG	CUGAUGA	X	GAA	AUGCUGCA	UGCAGCAUC	CAGUGGGC
956	CCCUGACA	CUGAUGA	X	GAA	AUGUGCUG	CAGCACAUU	UGUCAGGG
957	ACCCUGAC	CUGAUGA	X	GAA	AAUGUGCU	AGCACAUUU	GUCAGGGU
960	UGGACCCU	CUGAUGA	X	GAA	ACAAAUGU	ACAUUUGUC	AGGGUCCA
966	UUUUCAUG	CUGAUGA	X	GAA	ACCCUGAC	GUCAGGGUC	CAUGAAAA
979	AGCAACAA	CUGAUGA	X	GAA	AGGUUUUU	AAAAACCUU	UUGUUGCU
980	AAGCAACA	CUGAUGA	X	GAA	AAGGUUUU	AAAACCUUU	UGUUGCUU
981	AAAGCAAC	CUGAUGA	X	GAA	AAAGGUUU	AAACCUUUU	GUUGCUUU
984	CCAAAAGC	CUGAUGA	X	GAA	ACAAAAGG	CCUUUUGUU	GCUUUUGG
988	ACUUCCAA	CUGAUGA	X	GAA	AGCAACAA	UUGUUGCUU	UUGGAAGU
989	CACUUCCA	CUGAUGA	X	GAA	AAGCAACA	UGUUGCUUU	UGGAAGUG
990	CCACUUCC	CUGAUGA	X	GAA	AAAGCAAC	GUUGCUUUU	GGAAGUGG
1007	CCACCAGA	CUGAUGA	X	GAA	AUUCCAUG	CAUGGAAUC	UCUGGUGG
1009	UUCCACCA	CUGAUGA	X	GAA	AGAUUCCA	UGGAAUCUC	UGGUGGAA
1038	GGGAUUCU	CUGAUGA	X	GAA	ACACGCUC	GAGCGUGUC	AGAAUCCC
1044	UUCGCAGG	CUGAUGA	X	GAA	AUUCUGAC	GUCAGAAUC	CCUGCGAA
1055	AACCAAGG	CUGAUGA	X	GAA	ACUUCGCA	UGCGAAGUA	CCUUGGUU
1059	GGGUAACC	CUGAUGA	X	GAA	AGGUACUU	AAGUACCUU	GGUUACCC
1063	GGGUGGGU	CUGAUGA	X	GAA	ACCAAGGU	ACCUUGGUU	ACCCACCC
1064	GGGGUGGG	CUGAUGA	X	GAA	AACCAAGG	CCUUGGUUA	CCCACCCC
1080	UACCAUUU	CUGAUGA	X	GAA	AUUUCUGG	CCAGAAAUA	AAAUGGUA
1088	CAUUUUUA	CUGAUGA	X	GAA	ACCAUUUU	AAAAUGGUA	UAAAAAUG
1090	UCCAUUUU	CUGAUGA	X	GAA	AUACCAUU	AAUGGUAUA	AAAAUGGA
1101	UCAAGGGG	CUGAUGA	X	GAA	AUUCCAUU	AAUGGAAUA	CCCCUUGA
1107	UUGGACUC	CUGAUGA	X	GAA	AGGGGUAU	AUACCCCUU	GAGUCCAA
1112	UGUGAUUG	CUGAUGA	X	GAA	ACUCAAGG	CCUUGAGUC	CAAUCACA
1117	AAUUGUGU	CUGAUGA	X	GAA	AUUGGACU	AGUCCAAUC	ACACAAUU
1125	CCCGCUUU	CUGAUGA	X	GAA	AUUGUGUG	CACACAAUU	AAAGCGGG

1126	CCCCGCUU CUGAUGA X GAA AAUUGUGU	ACACAAUUA AAGCGGGG
1140	AUCGUCAG CUGAUGA X GAA ACAUGCCC	GGGCAUGUA CUGACGAU
1149	ACUUCCAU CUGAUGA X GAA AUCGUCAG	CUGACGAUU AUGGAAGU
1150	CACUUCCA CUGAUGA X GAA AAUCGUCA	UGACGAUUA UGGAAGUG
1180	GACAGUGU CUGAUGA X GAA AUUUCCUG	CAGGAAAUU ACACUGUC
1181	UGACAGUG CUGAUGA X GAA AAUUUCCU	AGGAAAUUA CACUGUCA
1188	GUAAGGAU CUGAUGA X GAA ACAGUGUA	UACACUGUC AUCCUUAC
1191	UUGGUAAG CUGAUGA X GAA AUGACAGU	ACUGUCAUC CUUACCAA
1194	GGAUUGGU CUGAUGA X GAA AGGAUGAC	GUCAUCCUU ACCAAUCC
1195	GGGAUUGG CUGAUGA X GAA AAGGAUGA	UCAUCCUUA CCAAUCCC
1201	UGAAAUGG CUGAUGA X GAA AUUGGUAA	UUACCAAUC CCAUUUCA
1206	UCCUUUGA CUGAUGA X GAA AUGGGAUU	AAUCCCAUU UCAAAGGA
1207	CUCCUUUG CUGAUGA X GAA AAUGGGAU	AUCCCAUUU CAAAGGAG
1208	UCUCCUUU CUGAUGA X GAA AAAUGGGA	UCCCAUUUC AAAGGAGA
1233	ACCAGAGA CUGAUGA X GAA ACCACAUG	CAUGUGGUC UCUCUGGU
1235	CAACCAGA CUGAUGA X GAA AGACCACA	UGUGGUCUC UCUGGUUG
1237	CACAACCA CUGAUGA X GAA AGAGACCA	UGGUCUCUC UGGUUGUG
1242	ACAUACAC CUGAUGA X GAA ACCAGAGA	UCUCUGGUU GUGUAUGU
1247	GUGGGACA CUGAUGA X GAA ACACAACC	GGUUGUGUA UGUCCCAC
1251	UGGGGUGG CUGAUGA X GAA ACAUACAC	GUGUAUGUC CCACCCCA
1263	UUCUCACC CUGAUGA X GAA AUCUGGGG	CCCCAGAUU GGUGAGAA
1274	AGAUUAGA CUGAUGA X GAA AUUUCUCA	UGAGAAAUC UCUAAUCU
1276	AGAGAUUA CUGAUGA X GAA AGAUUUCU	AGAAAUCUC UAAUCUCU
1278	GGAGAGAU CUGAUGA X GAA AGAGAUUU	AAAUCUCUA AUCUCUCC
1281	ACAGGAGA CUGAUGA X GAA AUUAGAGA	UCUCUAAUC UCUCCUGU
1283	CCACAGGA CUGAUGA X GAA AGAUUAGA	UCUAAUCUC UCCUGUGG
1285	AUCCACAG CUGAUGA X GAA AGAGAUUA	UAAUCUCUC CUGUGGAU
1294	CUGGUAGG CUGAUGA X GAA AUCCACAG	CUGUGGAUU CCUACCAG
1295	ACUGGUAG CUGAUGA X GAA AAUCCACA	UGUGGAUUC CUACCAGU
1298	CGUACUGG CUGAUGA X GAA AGGAAUCC	GGAUUCCUA CCAGUACG
1304	UGGUGCCG CUGAUGA X GAA ACUGGUAG	CUACCAGUA CGGCACCA
1315	CAGCGUUU CUGAUGA X GAA AGUGGUGC	GCACCACUC AAACGCUG
1330	AUAGACCG CUGAUGA X GAA ACAUGUCA	UGACAUGUA CGGUCUAU

1335	AUGGCAUA	CUGAUGA	X	GAA	ACCGUACA	UGUACGGUC	UAUGCCAU
1337	GAAUGGCA	CUGAUGA	X	GAA	AGACCGUA	UACGGUCUA	UGCCAUUC
1344	GGGGGAGG	CUGAUGA	X	GAA	AUGGCAUA	UAUGCCAUU	CCUCCCCC
1345	CGGGGGAG	CUGAUGA	X	GAA	AAUGGCAU	AUGCCAUUC	CUCCCCCG
1348	AUGCGGGG	CUGAUGA	X	GAA	AGGAAUGG	CCAUUCCUC	CCCCGCAU
1357	GUGGAUGU	CUGAUGA	X	GAA	AUGCGGGG	CCCCGCAUC	ACAUCCAC
1362	UACCAGUG	CUGAUGA	X	GAA	AUGUGAUG	CAUCACAUC	CACUGGUA
1370	ACUGCCAA	CUGAUGA	X	GAA	ACCAGUGG	CCACUGGUA	UUGGCAGU
1372	CAACUGCC	CUGAUGA	X	GAA	AUACCAGU	ACUGGUAUU	GGCAGUUG
1379	CUUCCUCC	CUGAUGA	X	GAA	ACUGCCAA	UUGGCAGUU	GGAGGAAG
1416	GUCACUGA	CUGAUGA	X	GAA	ACAGCUUG	CAAGCUGUC	UCAGUGAC
1418	UUGUCACU	CUGAUGA	X	GAA	AGACAGCU	AGCUGUCUC	AGUGACAA
1433	CACAAGGG	CUGAUGA	X	GAA	AUGGGUUU	AAACCCAUA	CCCUUGUG
1438	UUCUUCAC	CUGAUGA	X	GAA	AGGGUAUG	CAUACCCUU	GUGAAGAA
1466	CUCCCUGG	CUGAUGA	X	GAA	AGUCCUCC	GGAGGACUU	CCAGGGAG
1467	CCUCCCUG	CUGAUGA	X	GAA	AAGUCCUC	GAGGACUUC	CAGGGAGG
1480	UUCAAUUU	CUGAUGA	X	GAA	AUUUCCUC	GAGGAAAUA	AAAUUGAA
1485	UUAACUUC	CUGAUGA	X	GAA	AUUUUAUU	AAUAAAAUU	GAAGUUAA
1491	UUUUUAUU	CUGAUGA	X	GAA	ACUUCAAU	AUUGAAGUU	AAUAAAAA
1492	AUUUUUAU	CUGAUGA	X	GAA	AACUUCAA	UUGAAGUUA	AUAAAAAU
1495	UUGAUUUU	CUGAUGA	X	GAA	AUUAACUU	AAGUUAAUA	AAAAUCAA
1501	AGCAAAUU	CUGAUGA	X	GAA	AUUUUUAU	AUAAAAAUC	AAUUUGCU
1505	UUAGAGCA	CUGAUGA	X	GAA	AUUGAUUU	AAAUCAAUU	UGCUCUAA
1506	AUUAGAGC	CUGAUGA	X	GAA	AAUUGAUU	AAUCAAUUU	GCUCUAAU
1510	UUCAAUUA	CUGAUGA	X	GAA	AGCAAAUU	AAUUUGCUC	UAAUUGAA
1512	CCUUCAAU	CUGAUGA	X	GAA	AGAGCAAA	UUUGCUCUA	AUUGAAGG
1515	UUUCCUUC	CUGAUGA	X	GAA	AUUAGAGC	GCUCUAAUU	GAAGGAAA
1536	AGGGUACU	CUGAUGA	X	GAA	ACAGUUUU	AAAACUGUA	AGUACCCU
1540	AACAAGGG	CUGAUGA	X	GAA	ACUUACAG	CUGUAAGUA	CCCUUGUU
1545	UGGAUAAC	CUGAUGA	X	GAA	AGGGUACU	AGUACCCUU	GUUAUCCA
1548	GCUUGGAU	CUGAUGA	X	GAA	ACAAGGGU	ACCCUUGUU	AUCCAAGC
1549	CGCUUGGA	CUGAUGA	X	GAA	AACAAGGG	CCCUUGUUA	UCCAAGCG
1551	GCCGCUUG	CUGAUGA	X	GAA	AUAACAAG	CUUGUUAUC	CAAGCGGC

1568	ACAAAGCU CUGAUGA X GAA ACACAUUU	AAAUGUGUC AGCUUUGU
1573	UUUGUACA CUGAUGA X GAA AGCUGACA	UGUCAGCUU UGUACAAA
1574	AUUUGUAC CUGAUGA X GAA AAGCUGAC	GUCAGCUUU GUACAAAU
1577	CACAUUUG CUGAUGA X GAA ACAAAGCU	AGCUUUGUA CAAAUGUG
1593	ACUUUGUU CUGAUGA X GAA ACCGCUUC	GAAGCGGUC AACAAAGU
1602	CCUCUCCC CUGAUGA X GAA ACUUUGUU	AACAAAGUC GGGAGAGG
1623	UGGAAGGA CUGAUGA X GAA AUCACCCU	AGGGUGAUC UCCUUCCA
1625	CGUGGAAG CUGAUGA X GAA AGAUCACC	GGUGAUCUC CUUCCACG
1628	UCACGUGG CUGAUGA X GAA AGGAGAUC	GAUCUCCUU CCACGUGA
1629	GUCACGUG CUGAUGA X GAA AAGGAGAU	AUCUCCUUC CACGUGAC
1645	AAUUUCAG CUGAUGA X GAA ACCCCUGG	CCAGGGGUC CUGAAAUU
1653	UGCAAAGU CUGAUGA X GAA AUUUCAGG	CCUGAAAUU ACUUUGCA
1654	UUGCAAAG CUGAUGA X GAA AAUUUCAG	CUGAAAUUA CUUUGCAA
1657	AGGUUGCA CUGAUGA X GAA AGUAAUUU	AAAUUACUU UGCAACCU
1658	CAGGUUGC CUGAUGA X GAA AAGUAAUU	AAUUACUUU GCAACCUG
1697	ACCACAAA CUGAUGA X GAA ACACGCUC	GAGCGUGUC UUUGUGGU
1699	GCACCACA CUGAUGA X GAA AGACACGC	GCGUGUCUU UGUGGUGC
1700	UGCACCAC CUGAUGA X GAA AAGACACG	CGUGUCUUU GUGGUGCA
1721	CAAACGUA CUGAUGA X GAA AUCUGUCU	AGACAGAUC UACGUUUG
1723	CUCAAACG CUGAUGA X GAA AGAUCUGU	ACAGAUCUA CGUUUGAG
1727	GGUUCUCA CUGAUGA X GAA ACGUAGAU	AUCUACGUU UGAGAACC
1728	AGGUUCUC CUGAUGA X GAA AACGUAGA	UCUACGUUU GAGAACCU
1737	UACCAUGU CUGAUGA X GAA AGGUUCUC	GAGAACCUC ACAUGGUA
1745	CAAGCUUG CUGAUGA X GAA ACCAUGUG	CACAUGGUA CAAGCUUG
1752	UGUGGGCC CUGAUGA X GAA AGCUUGUA	UACAAGCUU GGCCCACA
1765	GAUUGGCA CUGAUGA X GAA AGGCUGUG	CACAGCCUC UGCCAAUC
1773	CCCACAUG CUGAUGA X GAA AUUGGCAG	CUGCCAAUC CAUGUGGG
1787	GUGUGGGC CUGAUGA X GAA ACUCUCCC	GGGAGAGUU GCCCACAC
1800	UUCUUGCA CUGAUGA X GAA ACAGGUGU	ACACCUGUU UGCAAGAA
1801	GUUCUUGC CUGAUGA X GAA AACAGGUG	CACCUGUUU GCAAGAAC
1811	GAGUAUCC CUGAUGA X GAA AGUUCUUG	CAAGAACUU GGAUACUC
1816	CCAAAGAG CUGAUGA X GAA AUCCAAGU	ACUUGGAUA CUCUUUGG
1819	UUUCCAAA CUGAUGA X GAA AGUAUCCA	UGGAUACUC UUUGGAAA

1821	AAUUUCCA CUGAUGA X GAA AGAGUAUC	GAUACUCUU UGGAAAUU
1822	CAAUUUCC CUGAUGA X GAA AAGAGUAU	AUACUCUUU GGAAAUUG
1829	UGGCAUUC CUGAUGA X GAA AUUUCCAA	UUGGAAAUU GAAUGCCA
1844	UAUUAGAG CUGAUGA X GAA ACAUGGUG	CACCAUGUU CUCUAAUA
1845	CUAUUAGA CUGAUGA X GAA AACAUGGU	ACCAUGUUC UCUAAUAG
1847	UGCUAUUA CUGAUGA X GAA AGAACAUG	CAUGUUCUC UAAUAGCA
1849	UGUGCUAU CUGAUGA X GAA AGAGAACA	UGUUCUCUA AUAGCACA
1852	AUUUGUGC CUGAUGA X GAA AUUAGAGA	UCUCUAAUA GCACAAAU
1866	AUGAUCAA CUGAUGA X GAA AUGUCAUU	AAUGACAUU UUGAUCAU
1867	CAUGAUCA CUGAUGA X GAA AAUGUCAU	AUGACAUUU UGAUCAUG
1868	CCAUGAUC CUGAUGA X GAA AAAUGUCA	UGACAUUUU GAUCAUGG
1872	AGCUCCAU CUGAUGA X GAA AUCAAAAU	AUUUUGAUC AUGGAGCU
1881	GCAUUCUU CUGAUGA X GAA AGCUCCAU	AUGGAGCUU AAGAAUGC
1882	UGCAUUCU CUGAUGA X GAA AAGCUCCA	UGGAGCUUA AGAAUGCA
1892	CCUGCAAG CUGAUGA X GAA AUGCAUUC	GAAUGCAUC CUUGCAGG
1895	GGUCCUGC CUGAUGA X GAA AGGAUGCA	UGCAUCCUU GCAGGACC
1913	GGCAGACA CUGAUGA X GAA AGUCUCCU	AGGAGACUA UGUCUGCC
1917	GCAAGGCA CUGAUGA X GAA ACAUAGUC	GACUAUGUC UGCCUUGC
1923	UCUUGAGC CUGAUGA X GAA AGGCAGAC	GUCUGCCUU GCUCAAGA
1927	CCUGUCUU CUGAUGA X GAA AGCAAGGC	GCCUUGCUC AAGACAGG
1954	GACCACGC CUGAUGA X GAA AUGUCUUU	AAAGACAUU GCGUGGUC
1962	AGCUGCCU CUGAUGA X GAA ACCACGCA	UGCGUGGUC AGGCAGCU
1971	AGGACUGU CUGAUGA X GAA AGCUGCCU	AGGCAGCUC ACAGUCCU
1977	CGCUCUAG CUGAUGA X GAA ACUGUGAG	CUCACAGUC CUAGAGCG
1980	ACACGCUC CUGAUGA X GAA AGGACUGU	ACAGUCCUA GAGCGUGU
2001	UUUCCUGU CUGAUGA X GAA AUCGUGGG	CCCACGAUC ACAGGAAA
2020	UGUCGUCU CUGAUGA X GAA AUUCUCCA	UGGAGAAUC AGACGACA
2032	UUCCCCAA CUGAUGA X GAA ACUUGUCG	CGACAAGUA UUGGGGAA
2034	CUUUCCCC CUGAUGA X GAA AUACUUGU	ACAAGUAUU GGGGAAAG
2046	GAGACUUC CUGAUGA X GAA AUGCUUUC	GAAAGCAUC GAAGUCUC
2052	GUGCAUGA CUGAUGA X GAA ACUUCGAU	AUCGAAGUC UCAUGCAC
2054	CCGUGCAU CUGAUGA X GAA AGACUUCG	CGAAGUCUC AUGCACGG
2066	GAUUCCCA CUGAUGA X GAA AUGCCGUG	CACGGCAUC UGGGAAUC

2074	UGGAGGGG	CUGAUGA	X	GAA	AUUCCCAG	CUGGGAAUC	CCCCUCCA
2080	GAUCUGUG	CUGAUGA	X	GAA	AGGGGGAU	AUCCCCCUC	CACAGAUC
2088	AACCACAU	CUGAUGA	X	GAA	AUCUGUGG	CCACAGAUC	AUGUGGUU
2096	UAUCUUUA	CUGAUGA	X	GAA	ACCACAUG	CAUGUGGUU	UAAAGAUA
2097	UUAUCUUU	CUGAUGA	X	GAA	AACCACAU	AUGUGGUUU	AAAGAUAA
2098	AUUAUCUU	CUGAUGA	X	GAA	AAACCACA	UGUGGUUUA	AAGAUAAU
2104	GGUCUCAU	CUGAUGA	X	GAA	AUCUUUAA	UUAAAGAUA	AUGAGACC
2115	UCUUCUAC	CUGAUGA	X	GAA	AGGGUCUC	GAGACCCUU	GUAGAAGA
2118	GAGUCUUC	CUGAUGA	X	GAA	ACAAGGGU	ACCCUUGUA	GAAGACUC
2126	CAAUGCCU	CUGAUGA	X	GAA	AGUCUUCU	AGAAGACUC	AGGCAUUG
2133	UUCAAUAC	CUGAUGA	X	GAA	AUGCCUGA	UCAGGCAUU	GUAUUGAA
2136	UCCUUCAA	CUGAUGA	X	GAA	ACAAUGCC	GGCAUUGUA	UUGAAGGA
2138	CAUCCUUC	CUGAUGA	X	GAA	AUACAAUG	CAUUGUAUU	GAAGGAUG
2160	CGGAUAGU	CUGAUGA	X	GAA	AGGUUCCG	CGGAACCUC	ACUAUCCG
2164	UCUGCGGA	CUGAUGA	X	GAA	AGUGAGGU	ACCUCACUA	UCCGCAGA
2166	ACUCUGCG	CUGAUGA	X	GAA	AUAGUGAG	CUCACUAUC	CGCAGAGU
2196	CAGGUGUA	CUGAUGA	X	GAA	AGGCCUUC	GAAGGCCUC	UACACCUG
2198	GGCAGGUG	CUGAUGA	X	GAA	AGAGGCCU	AGGCCUCUA	CACCUGCC
2220	CAGCCAAG	CUGAUGA	X	GAA	ACACUGCA	UGCAGUGUU	CUUGGCUG
2221	ACAGCCAA	CUGAUGA	X	GAA	AACACUGC	GCAGUGUUC	UUGGCUGU
2223	GCACAGCC	CUGAUGA	X	GAA	AGAACACU	AGUGUUCUU	GGCUGUGC
2246	UUAUGAAA	CUGAUGA	X	GAA	AUGCCUCC	GGAGGCAUU	UUUCAUAA
2247	AUUAUGAA	CUGAUGA	X	GAA	AAUGCCUC	GAGGCAUUU	UUCAUAAU
2248	UAUUAUGA	CUGAUGA	X	GAA	AAAUGCCU	AGGCAUUUU	UCAUAAUA
2249	CUAUUAUG	CUGAUGA	X	GAA	AAAAUGCC	GGCAUUUUU	CAUAAUAG
2250	UCUAUUAU	CUGAUGA	X	GAA	AAAAAUGC	GCAUUUUUC	AUAAUAGA
2253	CCUUCUAU	CUGAUGA	X	GAA	AUGAAAAA	UUUUUCAUA	AUAGAAGG
2256	GCACCUUC	CUGAUGA	X	GAA	AUUAUGAA	UUCAUAAUA	GAAGGUGC
2282	UGAUUUCC	CUGAUGA	X	GAA	AGUUCGUC	GACGAACUU	GGAAAUCA
2289	AGAAUAAU	CUGAUGA	X	GAA	AUUUCCAA	UUGGAAAUC	AUUAUUCU
2292	ACUAGAAU	CUGAUGA	X	GAA	AUGAUUUC	GAAAUCAUU	AUUCUAGU
2293	UACUAGAA	CUGAUGA	X	GAA	AAUGAUUU	AAAUCAUUA	UUCUAGUA
2295	CCUACUAG	CUGAUGA	X	GAA	AUAAUGAU	AUCAUUAUU	CUAGUAGG

2296	GCCUACUA CUGAUGA X GAA AAUAAUGA	UCAUUAUUC UAGUAGGC
2298	GUGCCUAC CUGAUGA X GAA AGAAUAAU	AUUAUUCUA GUAGGCAC
2301	GUCGUGCC CUGAUGA X GAA ACUAGAAU	AUUCUAGUA GGCACGAC
2316	AACAUGGC CUGAUGA X GAA AUCACCGU	ACGGUGAUU GCCAUGUU
2324	GCCAGAAG CUGAUGA X GAA ACAUGGCA	UGCCAUGUU CUUCUGGC
2325	AGCCAGAA CUGAUGA X GAA AACAUGGC	GCCAUGUUC UUCUGGCU
2327	GUAGCCAG CUGAUGA X GAA AGAACAUG	CAUGUUCUU CUGGCUAC
2328	AGUAGCCA CUGAUGA X GAA AAGAACAU	AUGUUCUUC UGGCUACU
2334	ACAAGAAG CUGAUGA X GAA AGCCAGAA	UUCUGGCUA CUUCUUGU
2337	AUGACAAG CUGAUGA X GAA AGUAGCCA	UGGCUACUU CUUGUCAU
2338	GAUGACAA CUGAUGA X GAA AAGUAGCC	GGCUACUUC UUGUCAUC
2340	AUGAUGAC CUGAUGA X GAA AGAAGUAG	CUACUUCUU GUCAUCAU
2343	AGGAUGAU CUGAUGA X GAA ACAAGAAG	CUUCUUGUC AUCAUCCU
2346	CCUAGGAU CUGAUGA X GAA AUGACAAG	CUUGUCAUC AUCCUAGG
2349	GUCCCUAG CUGAUGA X GAA AUGAUGAC	GUCAUCAUC CUAGGGAC
2352	ACGGUCCC CUGAUGA X GAA AGGAUGAU	AUCAUCCUA GGGACCGU
2361	GCCCGCUU CUGAUGA X GAA ACGGUCCC	GGGACCGUU AAGCGGGC
2362	GGCCCGCU CUGAUGA X GAA AACGGUCC	GGACCGUUA AGCGGGCC
2396	UGGACAAG CUGAUGA X GAA AGCCUGUC	GACAGGCUA CUUGUCCA
2399	CGAUGGAC CUGAUGA X GAA AGUAGCCU	AGGCUACUU GUCCAUCG
2402	UGACGAUG CUGAUGA X GAA ACAAGUAG	CUACUUGUC CAUCGUCA
2406	UCCAUGAC CUGAUGA X GAA AUGGACAA	UUGUCCAUC GUCAUGGA
2409	GGAUCCAU CUGAUGA X GAA ACGAUGGA	UCCAUCGUC AUGGAUCC
2416	UUCAUCUG CUGAUGA X GAA AUCCAUGA	UCAUGGAUC CAGAUGAA
2427	UCCAAUGG CUGAUGA X GAA AGUUCAUC	GAUGAACUC CCAUUGGA
2432	GUUCAUCC CUGAUGA X GAA AUGGGAGU	ACUCCCAUU GGAUGAAC
2443	UCGUUCAC CUGAUGA X GAA AUGUUCAU	AUGAACAUU GUGAACGA
2458	GGCAUCAU CUGAUGA X GAA AGGCAGUC	GACUGCCUU AUGAUGCC
2459	UGGCAUCA CUGAUGA X GAA AAGGCAGU	ACUGCCUUA UGAUGCCA
2480	CUCUGGGG CUGAUGA X GAA AUUCCCAU	AUGGGAAUU CCCCAGAG
2481	UCUCUGGG CUGAUGA X GAA AAUUCCCA	UGGGAAUUC CCCAGAGA
2502	GGCUUACC CUGAUGA X GAA AGGUUCAG	CUGAACCUA GGUAAGCC
2506	AAGAGGCU CUGAUGA X GAA ACCUAGGU	ACCUAGGUA AGCCUCUU

2512	ACGGCCAA CUGAUGA X GAA AGGCUUAC	GUAAGCCUC UUGGCCGU
2514	CCACGGCC CUGAUGA X GAA AGAGGCUU	AAGCCUCUU GGCCGUGG
2528	CUUGGCCA CUGAUGA X GAA AGGCACCA	UGGUGCCUU UGGCCAAG
2529	UCUUGGCC CUGAUGA X GAA AAGGCACC	GGUGCCUUU GGCCAAGA
2541	UCUGCUUC CUGAUGA X GAA AUCUCUUG	CAAGAGAUU GAAGCAGA
2555	CAAUUCCA CUGAUGA X GAA AGGCAUCU	AGAUGCCUU UGGAAUUG
2556	UCAAUUCC CUGAUGA X GAA AAGGCAUC	GAUGCCUUU GGAAUUGA
2562	GUCUUGUC CUGAUGA X GAA AUUCCAAA	UUUGGAAUU GACAAGAC
2578	UGUCCUGC CUGAUGA X GAA AGUUGCUG	CAGCAACUU GCAGGACA
2589	UUGACUGC CUGAUGA X GAA ACUGUCCU	AGGACAGUA GCAGUCAA
2595	AACAUUUU CUGAUGA X GAA ACUGCUAC	GUAGCAGUC AAAAUGUU
2603	CUUCUUUC CUGAUGA X GAA ACAUUUUG	CAAAAUGUU GAAAGAAG
2632	GAGAGCUC CUGAUGA X GAA AUGCUCAC	GUGAGCAUC GAGCUCUC
2638	AGACAUGA CUGAUGA X GAA AGCUCGAU	AUCGAGCUC UCAUGUCU
2640	UCAGACAU CUGAUGA X GAA AGAGCUCG	CGAGCUCUC AUGUCUGA
2645	UGAGUUCA CUGAUGA X GAA ACAUGAGA	UCUCAUGUC UGAACUCA
2652	AGGAUCUU CUGAUGA X GAA AGUUCAGA	UCUGAACUC AAGAUCCU
2658	UGAAUGAG CUGAUGA X GAA AUCUUGAG	CUCAAGAUC CUCAUUCA
2661	AUAUGAAU CUGAUGA X GAA AGGAUCUU	AAGAUCCUC AUUCAUAU
2664	CCAAUAUG CUGAUGA X GAA AUGAGGAU	AUCCUCAUU CAUAUUGG
2665	ACCAAUAU CUGAUGA X GAA AAUGAGGA	UCCUCAUUC AUAUUGGU
2668	GUGACCAA CUGAUGA X GAA AUGAAUGA	UCAUUCAUA UUGGUCAC
2670	UGGUGACC CUGAUGA X GAA AUAUGAAU	AUUCAUAUU GGUCACCA
2674	GAGAUGGU CUGAUGA X GAA ACCAAUAU	AUAUUGGUC ACCAUCUC
2680	CACAUUGA CUGAUGA X GAA AUGGUGAC	GUCACCAUC UCAAUGUG
2682	ACCACAUU CUGAUGA X GAA AGAUGGUG	CACCAUCUC AAUGUGGU
2691	AGAAGGUU CUGAUGA X GAA ACCACAUU	AAUGUGGUC AACCUUCU
2697	GCACCUAG CUGAUGA X GAA AGGUUGAC	GUCAACCUU CUAGGUGC
2698	GGCACCUA CUGAUGA X GAA AAGGUUGA	UCAACCUUC UAGGUGCC
2700	CAGGCACC CUGAUGA X GAA AGAAGGUU	AACCUUCUA GGUGCCUG
2710	UGGCUUGG CUGAUGA X GAA ACAGGCAC	GUGCCUGUA CCAAGCCA
2730	AUCACCAU CUGAUGA X GAA AGUGGCCC	GGGCCACUC AUGGUGAU
2739	AAUUCCAC CUGAUGA X GAA AUCACCAU	AUGGUGAUU GUGGAAUU

2747	AUUUGCAG CUGAUGA X GAA AUUCCACA	UGUGGAAUU CUGCAAAU
2748	AAUUUGCA CUGAUGA X GAA AAUUCCAC	GUGGAAUUC UGCAAAUU
2756	GGUUUCCA CUGAUGA X GAA AUUUGCAG	CUGCAAAUU UGGAAACC
2757	AGGUUUCC CUGAUGA X GAA AAUUUGCA	UGCAAAUUU GGAAACCU
2768	GGUAAGUG CUGAUGA X GAA ACAGGUUU	AAACCUGUC CACUUACC
2773	CCUCAGGU CUGAUGA X GAA AGUGGACA	UGUCCACUU ACCUGAGG
2774	UCCUCAGG CUGAUGA X GAA AAGUGGAC	GUCCACUUA CCUGAGGA
2798	AGGGGACA CUGAUGA X GAA AUUCAUUU	AAAUGAAUU UGUCCCCU
2799	UAGGGGAC CUGAUGA X GAA AAUUCAUU	AAUGAAUUU GUCCCCUA
2802	UUGUAGGG CUGAUGA X GAA ACAAAUUC	GAAUUUGUC CCCUACAA
2807	UGGUCUUG CUGAUGA X GAA AGGGGACA	UGUCCCCUA CAAGACCA
2828	CUUGACGG CUGAUGA X GAA AUCGUGCC	GGCACGAUU CCGUCAAG
2829	CCUUGACG CUGAUGA X GAA AAUCGUGC	GCACGAUUC CGUCAAGG
2833	UUUCCCUU CUGAUGA X GAA ACGGAAUC	GAUUCCGUC AAGGGAAA
2846	CUCCAACG CUGAUGA X GAA AGUCUUUC	GAAAGACUA CGUUGGAG
2850	AUUGCUCC CUGAUGA X GAA ACGUAGUC	GACUACGUU GGAGCAAU
2859	UCCACAGG CUGAUGA X GAA AUUGCUCC	GGAGCAAUC CCUGUGGA
2869	CCGUUUCA CUGAUGA X GAA AUCCACAG	CUGUGGAUC UGAAACGG
2882	UGCUGUCC CUGAUGA X GAA AGCGCCGU	ACGGCGCUU GGACAGCA
2892	CUACUGGU CUGAUGA X GAA AUGCUGUC	GACAGCAUC ACCAGUAG
2899	GCUCUGGC CUGAUGA X GAA ACUGGUGA	UCACCAGUA GCCAGAGC
2909	AGCUGGCU CUGAUGA X GAA AGCUCUGG	CCAGAGCUC AGCCAGCU
2918	CAAAUCCA CUGAUGA X GAA AGCUGGCU	AGCCAGCUC UGGAUUUG
2924	CCUCCACA CUGAUGA X GAA AUCCAGAG	CUCUGGAUU UGUGGAGG
2925	UCCUCCAC CUGAUGA X GAA AAUCCAGA	UCUGGAUUU GUGGAGGA
2939	CACUGAGG CUGAUGA X GAA ACUUCUCC	GGAGAAGUC CCUCAGUG
2943	ACAUCACU CUGAUGA X GAA AGGGACUU	AAGUCCCUC AGUGAUGU
2952	UCUUCUUC CUGAUGA X GAA ACAUCACU	AGUGAUGUA GAAGAAGA
2968	AUCUUCAG CUGAUGA X GAA AGCUUCCU	AGGAAGCUC CUGAAGAU
2977	CUUAUACA CUGAUGA X GAA AUCUUCAG	CUGAAGAUC UGUAUAAG
2981	AGUCCUUA CUGAUGA X GAA ACAGAUCU	AGAUCUGUA UAAGGACU
2983	GAAGUCCU CUGAUGA X GAA AUACAGAU	AUCUGUAUA AGGACUUC
2990	AGGUCAGG CUGAUGA X GAA AGUCCUUA	UAAGGACUU CCUGACCU

2991	AAGGUCAG	CUGAUGA	X	GAA	AAGUCCUU	AAGGACUUC	CUGACCUU
2999	GAUGCUCC	CUGAUGA	X	GAA	AGGUCAGG	CCUGACCUU	GGAGCAUC
3007	ACAGAUGA	CUGAUGA	X	GAA	AUGCUCCA	UGGAGCAUC	UCAUCUGU
3009	UAACAGAU	CUGAUGA	X	GAA	AGAUGCUC	GAGCAUCUC	AUCUGUUA
3012	CUGUAACA	CUGAUGA	X	GAA	AUGAGAUG	CAUCUCAUC	UGUUACAG
3016	GAAGCUGU	CUGAUGA	X	GAA	ACAGAUGA	UCAUCUGUU	ACAGCUUC
3017	GGAAGCUG	CUGAUGA	X	GAA	AACAGAUG	CAUCUGUUA	CAGCUUCC
3023	CCACUUGG	CUGAUGA	X	GAA	AGCUGUAA	UUACAGCUU	CCAAGUGG
3024	GCCACUUG	CUGAUGA	X	GAA	AAGCUGUA	UACAGCUUC	CAAGUGGC
3034	CAUGCCCU	CUGAUGA	X	GAA	AGCCACUU	AAGUGGCUA	AGGGCAUG
3047	AUGCCAAG	CUGAUGA	X	GAA	ACUCCAUG	CAUGGAGUU	CUUGGCAU
3048	GAUGCCAA	CUGAUGA	X	GAA	AACUCCAU	AUGGAGUUC	UUGGCAUC
3050	GCGAUGCC	CUGAUGA	X	GAA	AGAACUCC	GGAGUUCUU	GGCAUCGC
3056	ACUUUCGC	CUGAUGA	X	GAA	AUGCCAAG	CUUGGCAUC	GCGAAAGU
3067	CCUGUGGA	CUGAUGA	X	GAA	ACACUUUC	GAAAGUGUA	UCCACAGG
3069	UCCCUGUG	CUGAUGA	X	GAA	AUACACUU	AAGUGUAUC	CACAGGGA
3094	UAAGAGGA	CUGAUGA	X	GAA	AUUUCGUG	CACGAAAUA	UCCUCUUA
3096	GAUAAGAG	CUGAUGA	X	GAA	AUAUUUCG	CGAAAUAUC	CUCUUAUC
3099	UCCGAUAA	CUGAUGA	X	GAA	AGGAUAUU	AAUAUCCUC	UUAUCGGA
3101	UCUCCGAU	CUGAUGA	X	GAA	AGAGGAUA	UAUCCUCUU	AUCGGAGA
3102	UUCUCCGA	CUGAUGA	X	GAA	AAGAGGAU	AUCCUCUUA	UCGGAGAA
3104	UCUUCUCC	CUGAUGA	X	GAA	AUAAGAGG	CCUCUUAUC	GGAGAAGA
3120	CAGAUUUU	CUGAUGA	X	GAA	ACCACGUU	AACGUGGUU	AAAAUCUG
3121	ACAGAUUU	CUGAUGA	X	GAA	AACCACGU	ACGUGGUUA	AAAUCUGU
3126	AAGUCACA	CUGAUGA	X	GAA	AUUUUAAC	GUUAAAAUC	UGUGACUU
3134	CCAAGCCA	CUGAUGA	X	GAA	AGUCACAG	CUGUGACUU	UGGCUUGG
3135	GCCAAGCC	CUGAUGA	X	GAA	AAGUCACA	UGUGACUUU	GGCUUGGC
3140	CCCGGGCC	CUGAUGA	X	GAA	AGCCAAAG	CUUUGGCUU	GGCCCGGG
3151	UUUAUAAA	CUGAUGA	X	GAA	AUCCCGGG	CCCGGGAUA	UUUAUAAA
3153	UCUUUAUA	CUGAUGA	X	GAA	AUAUCCCG	CGGGAUAUU	UAUAAAGA
3154	AUCUUUAU	CUGAUGA	X	GAA	AAUAUCCC	GGGAUAUUU	AUAAAGAU
3155	GAUCUUUA	CUGAUGA	X	GAA	AAAUAUCC	GGAUAUUUA	UAAAGAUC
3157	UGGAUCUU	CUGAUGA	X	GAA	AUAAAUAU	AUAUUUAUA	AAGAUCCA

3163	AUAAUCUG CUGAUGA X GAA AUCUUUAU	AUAAAGAUC CAGAUUAU
3169	UCUGACAU CUGAUGA X GAA AUCUGGAU	AUCCAGAUU AUGUCAGA
3170	UUCUGACA CUGAUGA X GAA AAUCUGGA	UCCAGAUUA UGUCAGAA
3174	CCUUUUCU CUGAUGA X GAA ACAUAAUC	GAUUAUGUC AGAAAAGG
3190	AGGGAGGC CUGAUGA X GAA AGCAUCUC	GAGAUGCUC GCCUCCCU
3195	UUCAAAGG CUGAUGA X GAA AGGCGAGC	GCUCGCCUC CCUUUGAA
3199	CCAUUUCA CUGAUGA X GAA AGGGAGGC	GCCUCCCUU UGAAAUGG
3200	UCCAUUUC CUGAUGA X GAA AAGGGAGG	CCUCCCUUU GAAAUGGA
3225	CUGUCAAA CUGAUGA X GAA AUUGUUUC	GAAACAAUU UUUGACAG
3226	UCUGUCAA CUGAUGA X GAA AAUUGUUU	AAACAAUUU UUGACAGA
3227	CUCUGUCA CUGAUGA X GAA AAAUUGUU	AACAAUUUU UGACAGAG
3228	ACUCUGUC CUGAUGA X GAA AAAAUUGU	ACAAUUUUU GACAGAGU
3239	GGAUUGUG CUGAUGA X GAA ACACUCUG	CAGAGUGUA CACAAUCC
3246	UCACUCUG CUGAUGA X GAA AUUGUGUA	UACACAAUC CAGAGUGA
3258	AAAGACCA CUGAUGA X GAA ACGUCACU	AGUGACGUC UGGUCUUU
3263	CACCAAAA CUGAUGA X GAA ACCAGACG	CGUCUGGUC UUUUGGUG
3265	AACACCAA CUGAUGA X GAA AGACCAGA	UCUGGUCUU UUGGUGUU
3266	AAACACCA CUGAUGA X GAA AAGACCAG	CUGGUCUUU UGGUGUUU
3267	AAAACACC CUGAUGA X GAA AAAGACCA	UGGUCUUUU GGUGUUUU
3273	CACAGCAA CUGAUGA X GAA ACACCAAA	UUUGGUGUU UUGCUGUG
3274	CCACAGCA CUGAUGA X GAA AACACCAA	UUGGUGUUU UGCUGUGG
3275	CCCACAGC CUGAUGA X GAA AAACACCA	UGGUGUUUU GCUGUGGG
3288	AAGGAAAA CUGAUGA X GAA AUUUCCCA	UGGGAAAUA UUUUCCUU
3290	CUAAGGAA CUGAUGA X GAA AUAUUUCC	GGAAAUAUU UUCCUUAG
3291	CCUAAGGA CUGAUGA X GAA AAUAUUUC	GAAAUAUUU UCCUUAGG
3292	ACCUAAGG CUGAUGA X GAA AAAUAUUU	AAAUAUUUU CCUUAGGU
3293	CACCUAAG CUGAUGA X GAA AAAAUAUU	AAUAUUUUC CUUAGGUG
3296	AAGCACCU CUGAUGA X GAA AGGAAAAU	AUUUUCCUU AGGUGCUU
3297	GAAGCACC CUGAUGA X GAA AAGGAAAA	UUUUCCUUA GGUGCUUC
3304	AUAUGGAG CUGAUGA X GAA AGCACCUA	UAGGUGCUU CUCCAUAU
3305	GAUAUGGA CUGAUGA X GAA AAGCACCU	AGGUGCUUC UCCAUAUC
3307	AGGAUAUG CUGAUGA X GAA AGAAGCAC	GUGCUUCUC CAUAUCCU
3311	CCCCAGGA CUGAUGA X GAA AUGGAGAA	UUCUCCAUA UCCUGGGG

3313	UACCCCAG	CUGAUGA	X	GAA	AUAUGGAG	CUCCAUAUC CUGGGGUA
3321	UCAAUCUU	CUGAUGA	X	GAA	ACCCCAGG	CCUGGGGUA AAGAUUGA
3327	UCUUCAUC	CUGAUGA	X	GAA	AUCUUUAC	GUAAAGAUU GAUGAAGA
3338	GCCUACAA	CUGAUGA	X	GAA	AUUCUUCA	UGAAGAAUU UUGUAGGC
3339	CGCCUACA	CUGAUGA	X	GAA	AAUUCUUC	GAAGAAUUU UGUAGGCG
3340	UCGCCUAC	CUGAUGA	X	GAA	AAAUUCUU	AAGAAUUUU GUAGGCGA
3343	CAAUCGCC	CUGAUGA	X	GAA	ACAAAAUU	AAUUUUGUA GGCGAUUG
3350	CUUCUUUC	CUGAUGA	X	GAA	AUCGCCUA	UAGGCGAUU GAAAGAAG
3364	CCUCAUUC	CUGAUGA	X	GAA	AGUUCCUU	AAGGAACUA GAAUGAGG
3382	UGUAGUAU	CUGAUGA	X	GAA	AUCAGGGG	CCCCUGAUU AUACUACA
3383	GUGUAGUA	CUGAUGA	X	GAA	AAUCAGGG	CCCUGAUUA UACUACAC
3385	UGGUGUAG	CUGAUGA	X	GAA	AUAAUCAG	CUGAUUAUA CUACACCA
3388	UUCUGGUG	CUGAUGA	X	GAA	AGUAUAAU	AUUAUACUA CACCAGAA
3401	UGGUCUGG	CUGAUGA	X	GAA	ACAUUUCU	AGAAAUGUA CCAGACCA
3439	GGGUCUCU	CUGAUGA	X	GAA	ACUGGGCU	AGCCCAGUC AGAGACCC
3452	ACUCUGAA	CUGAUGA	X	GAA	ACGUGGGU	ACCCACGUU UUCAGAGU
3453	AACUCUGA	CUGAUGA	X	GAA	AACGUGGG	CCCACGUUU UCAGAGUU
3454	CAACUCUG	CUGAUGA	X	GAA	AAACGUGG	CCACGUUUU CAGAGUUG
3455	CCAACUCU	CUGAUGA	X	GAA	AAAACGUG	CACGUUUUC AGAGUUGG
3461	GUUCCACC	CUGAUGA	X	GAA	ACUCUGAA	UUCAGAGUU GGUGGAAC
3472	AUUUCCCA	CUGAUGA	X	GAA	AUGUUCCA	UGGAACAUU UGGGAAAU
3473	GAUUUCCC	CUGAUGA	X	GAA	AAUGUUCC	GGAACAUUU GGGAAAUC
3481	UUGCAAGA	CUGAUGA	X	GAA	AUUUCCCA	UGGGAAAUC UCUUGCAA
3483	GCUUGCAA	CUGAUGA	X	GAA	AGAUUUCC	GGAAAUCUC UUGCAAGC
3485	UAGCUUGC	CUGAUGA	X	GAA	AGAGAUUU	AAAUCUCUU GCAAGCUA
3493	CUGAGCAU	CUGAUGA	X	GAA	AGCUUGCA	UGCAAGCUA AUGCUCAG
3499	AUCCUGCU	CUGAUGA	X	GAA	AGCAUUAG	CUAAUGCUC AGCAGGAU
3518	GAACAAUG	CUGAUGA	X	GAA	AGUCUUUG	CAAAGACUA CAUUGUUC
3522	GGAAGAAC	CUGAUGA	X	GAA	AUGUAGUC	GACUACAUU GUUCUUCC
3525	AUCGGAAG	CUGAUGA	X	GAA	ACAAUGUA	UACAUUGUU CUUCCGAU
3526	UAUCGGAA	CUGAUGA	X	GAA	AACAAUGU	ACAUUGUUC UUCCGAUA
3528	GAUAUCGG	CUGAUGA	X	GAA	AGAACAAU	AUUGUUCUU CCGAUAUC
3529	UGAUAUCG	CUGAUGA	X	GAA	AAGAACAA	UUGUUCUUC CGAUAUCA

3534	GUCUCUGA CUGAUGA X GAA AUCGGAAG	CUUCCGAUA UCAGAGAC
3536	AAGUCUCU CUGAUGA X GAA AUAUCGGA	UCCGAUAUC AGAGACUU
3544	CAUGCUCA CUGAUGA X GAA AGUCUCUG	CAGAGACUU UGAGCAUG
3545	CCAUGCUC CUGAUGA X GAA AAGUCUCU	AGAGACUUU GAGCAUGG
3562	GAGUCCAG CUGAUGA X GAA AUCCUCUU	AAGAGGAUU CUGGACUC
3563	AGAGUCCA CUGAUGA X GAA AAUCCUCU	AGAGGAUUC UGGACUCU
3570	GGCAGAGA CUGAUGA X GAA AGUCCAGA	UCUGGACUC UCUCUGCC
3572	UAGGCAGA CUGAUGA X GAA AGAGUCCA	UGGACUCUC UCUGCCUA
3574	GGUAGGCA CUGAUGA X GAA AGAGAGUC	GACUCUCUC UGCCUACC
3580	AGGUGAGG CUGAUGA X GAA AGGCAGAG	CUCUGCCUA CCUCACCU
3584	AAACAGGU CUGAUGA X GAA AGGUAGGC	GCCUACCUC ACCUGUUU
3591	AUACAGGA CUGAUGA X GAA ACAGGUGA	UCACCUGUU UCCUGUAU
3592	CAUACAGG CUGAUGA X GAA AACAGGUG	CACCUGUUU CCUGUAUG
3593	CCAUACAG CUGAUGA X GAA AAACAGGU	ACCUGUUUC CUGUAUGG
3598	CUCCUCCA CUGAUGA X GAA ACAGGAAA	UUUCCUGUA UGGAGGAG
3615	GGGUCACA CUGAUGA X GAA ACUUCCUC	GAGGAAGUA UGUGACCC
3629	CAUAAUGG CUGAUGA X GAA AUUUGGGG	CCCCAAAUU CCAUUAUG
3630	UCAUAAUG CUGAUGA X GAA AAUUUGGG	CCCAAAUUC CAUUAUGA
3634	GUUGUCAU CUGAUGA X GAA AUGGAAUU	AAUUCCAUU AUGACAAC
3635	UGUUGUCA CUGAUGA X GAA AAUGGAAU	AUUCCAUUA UGACAACA
3654	UACUGACU CUGAUGA X GAA AUUCCUGC	GCAGGAAUC AGUCAGUA
3658	CAGAUACU CUGAUGA X GAA ACUGAUUC	GAAUCAGUC AGUAUCUG
3662	UCUGCAGA CUGAUGA X GAA ACUGACUG	CAGUCAGUA UCUGCAGA
3664	GUUCUGCA CUGAUGA X GAA AUACUGAC	GUCAGUAUC UGCAGAAC
3676	CUUUCGCU CUGAUGA X GAA ACUGUUCU	AGAACAGUA AGCGAAAG
3702	AAUGUUUU CUGAUGA X GAA ACACUCAC	GUGAGUGUA AAAACAUU
3710	UAUCUUCA CUGAUGA X GAA AUGUUUUU	AAAAACAUU UGAAGAUA
3711	AUAUCUUC CUGAUGA X GAA AAUGUUUU	AAAACAUUU GAAGAUAU
3718	UAACGGGA CUGAUGA X GAA AUCUUCAA	UUGAAGAUA UCCCGUUA
3720	UCUAACGG CUGAUGA X GAA AUAUCUUC	GAAGAUAUC CCGUUAGA
3725	GUUCUUCU CUGAUGA X GAA ACGGGAUA	UAUCCCGUU AGAAGAAC
3726	GGUUCUUC CUGAUGA X GAA AACGGGAU	AUCCCGUUA GAAGAACC
3741	AUUACUUU CUGAUGA X GAA ACUUCUGG	CCAGAAGUA AAAGUAAU

3747	UCUGGGAU	CUGAUGA	X	GAA	ACUUUUAC	GUAAAAGUA AUCCCAGA
3750	UCAUCUGG	CUGAUGA	X	GAA	AUUACUUU	AAAGUAAUC CCAGAUGA
3778	AAGAACCA	CUGAUGA	X	GAA	ACCACUGU	ACAGUGGUA UGGUUCUU
3783	GAGGCAAG	CUGAUGA	X	GAA	ACCAUACC	GGUAUGGUU CUUGCCUC
3784	UGAGGCAA	CUGAUGA	X	GAA	AACCAUAC	GUAUGGUUC UUGCCUCA
3786	UCUGAGGC	CUGAUGA	X	GAA	AGAACCAU	AUGGUUCUU GCCUCAGA
3791	GCUCUUCU	CUGAUGA	X	GAA	AGGCAAGA	UCUUGCCUC AGAAGAGC
3808	GUCUUCCA	CUGAUGA	X	GAA	AGUUUUCA	UGAAAACUU UGGAAGAC
3809	UGUCUUCC	CUGAUGA	X	GAA	AAGUUUUC	GAAAACUUU GGAAGACA
3827	AUGGAGAU	CUGAUGA	X	GAA	AUUUGGUU	AACCAAAUU AUCUCCAU
3828	GAUGGAGA	CUGAUGA	X	GAA	AAUUUGGU	ACCAAAUUA UCUCCAUC
3830	AAGAUGGA	CUGAUGA	X	GAA	AUAAUUUG	CAAAUUAUC UCCAUCUU
3832	AAAAGAUG	CUGAUGA	X	GAA	AGAUAAUU	AAUUAUCUC CAUCUUUU
3836	CACCAAAA	CUGAUGA	X	GAA	AUGGAGAU	AUCUCCAUC UUUUGGUG
3838	UCCACCAA	CUGAUGA	X	GAA	AGAUGGAG	CUCCAUCUU UUGGUGGA
3839	UUCCACCA	CUGAUGA	X	GAA	AAGAUGGA	UCCAUCUUU UGGUGGAA
3840	AUUCCACC	CUGAUGA	X	GAA	AAAGAUGG	CCAUCUUUU GGUGGAAU
3872	AUGCCACA	CUGAUGA	X	GAA	ACUCCCUG	CAGGGAGUC UGUGGCAU
3881	AGCCUUCA	CUGAUGA	X	GAA	AUGCCACA	UGUGGCAUC UGAAGGCU
3890	UCUGGUUU	CUGAUGA	X	GAA	AGCCUUCA	UGAAGGCUC AAACCAGA
3908	CGGACUGG	CUGAUGA	X	GAA	AGCCGCUU	AAGCGGCUA CCAGUCCG
3914	GAUAUCCG	CUGAUGA	X	GAA	ACUGGUAG	CUACCAGUC CGGAUAUC
3920	CGGAGUGA	CUGAUGA	X	GAA	AUCCGGAC	GUCCGGAUA UCACUCCG
3922	AUCGGAGU	CUGAUGA	X	GAA	AUAUCCGG	CCGGAUAUC ACUCCGAU
3926	UGUCAUCG	CUGAUGA	X	GAA	AGUGAUAU	AUAUCACUC CGAUGACA
3950	CACUGGAG	CUGAUGA	X	GAA	ACACGGUG	CACCGUGUA CUCCAGUG
3953	CCUCACUG	CUGAUGA	X	GAA	AGUACACG	CGUGUACUC CAGUGAGG
3972	AGCUUUAA	CUGAUGA	X	GAA	AGUUCUGC	GCAGAACUU UUAAAGCU
3973	CAGCUUUA	CUGAUGA	X	GAA	AAGUUCUG	CAGAACUUU UAAAGCUG
3974	UCAGCUUU	CUGAUGA	X	GAA	AAAGUUCU	AGAACUUUU AAAGCUGA
3975	AUCAGCUU	CUGAUGA	X	GAA	AAAAGUUC	GAACUUUUA AAGCUGAU
3984	CCAAUCUC	CUGAUGA	X	GAA	AUCAGCUU	AAGCUGAUA GAGAUUGG
3990	UGCACUCC	CUGAUGA	X	GAA	AUCUCUAU	AUAGAGAUU GGAGUGCA

4006	GGCUGUGC CUGAUGA X GAA ACCGGUUU	AAACCGGUA GCACAGCC
4020	GGCUGGAG CUGAUGA X GAA AUCUGGGC	GCCCAGAUU CUCCAGCC
4021	AGGCUGGA CUGAUGA X GAA AAUCUGGG	CCCAGAUUC UCCAGCCU
4023	UCAGGCUG CUGAUGA X GAA AGAAUCUG	CAGAUUCUC CAGCCUGA
4052	CAGGAGGA CUGAUGA X GAA AGCUCAGU	ACUGAGCUC UCCUCCUG
4054	AACAGGAG CUGAUGA X GAA AGAGCUCA	UGAGCUCUC CUCCUGUU
4057	UUAAACAG CUGAUGA X GAA AGGAGAGC	GCUCUCCUC CUGUUUAA
4062	UCCUUUUA CUGAUGA X GAA ACAGGAGG	CCUCCUGUU UAAAAGGA
4063	UUCCUUUU CUGAUGA X GAA AACAGGAG	CUCCUGUUU AAAAGGAA
4064	CUUCCUUU CUGAUGA X GAA AAACAGGA	UCCUGUUUA AAAGGAAG
4076	GGGGUGUG CUGAUGA X GAA AUGCUUCC	GGAAGCAUC CACACCCC
4089	AUGUCCGG CUGAUGA X GAA AGUUGGGG	CCCCAACUC CCGGACAU
4098	UCUCAUGU CUGAUGA X GAA AUGUCCGG	CCGGACAUC ACAUGAGA
4110	UCUGAGCA CUGAUGA X GAA ACCUCUCA	UGAGAGGUC UGCUCAGA
4115	CAAAAUCU CUGAUGA X GAA AGCAGACC	GGUCUGCUC AGAUUUUG
4120	CACUUCAA CUGAUGA X GAA AUCUGAGC	GCUCAGAUU UUGAAGUG
4121	ACACUUCA CUGAUGA X GAA AAUCUGAG	CUCAGAUUU UGAAGUGU
4122	AACACUUC CUGAUGA X GAA AAAUCUGA	UCAGAUUUU GAAGUGUU
4130	GAAAGAAC CUGAUGA X GAA ACACUUCA	UGAAGUGUU GUUCUUUC
4133	GUGGAAAG CUGAUGA X GAA ACAACACU	AGUGUUGUU CUUUCCAC
4134	GGUGGAAA CUGAUGA X GAA AACAACAC	GUGUUGUUC UUUCCACC
4136	CUGGUGGA CUGAUGA X GAA AGAACAAC	GUUGUUCUU UCCACCAG
4137	GCUGGUGG CUGAUGA X GAA AAGAACAA	UUGUUCUUU CCACCAGC
4138	UGCUGGUG CUGAUGA X GAA AAAGAACA	UGUUCUUUC CACCAGCA
4153	AAUGCGGC CUGAUGA X GAA ACUUCCUG	CAGGAAGUA GCCGCAUU
4161	GAAAAUCA CUGAUGA X GAA AUGCGGCU	AGCCGCAUU UGAUUUUC
4162	UGAAAAUC CUGAUGA X GAA AAUGCGGC	GCCGCAUUU GAUUUUCA
4166	GAAAUGAA CUGAUGA X GAA AUCAAAUG	CAUUUGAUU UUCAUUUC
4167	CGAAAUGA CUGAUGA X GAA AAUCAAAU	AUUUGAUUU UCAUUUCG
4168	UCGAAAUG CUGAUGA X GAA AAAUCAAA	UUUGAUUUU CAUUUCGA
4169	GUCGAAAU CUGAUGA X GAA AAAAUCAA	UUGAUUUUC AUUUCGAC
4172	GUUGUCGA CUGAUGA X GAA AUGAAAAU	AUUUUCAUU UCGACAAC
4173	UGUUGUCG CUGAUGA X GAA AAUGAAAA	UUUUCAUUU CGACAACA

4174	CUGUUGUC	CUGAUGA	X	GAA	AAAUGAAA	UUUCAUUUC GACAACAG
4194	UGCAGUCC	CUGAUGA	X	GAA	AGGUCCUU	AAGGACCUC GGACUGCA
4214	GCCUAGAA	CUGAUGA	X	GAA	AGCUGGCU	AGCCAGCUC UUCUAGGC
4216	AAGCCUAG	CUGAUGA	X	GAA	AGAGCUGG	CCAGCUCUU CUAGGCUU
4217	CAAGCCUA	CUGAUGA	X	GAA	AAGAGCUG	CAGCUCUUC UAGGCUUG
4219	CACAAGCC	CUGAUGA	X	GAA	AGAAGAGC	GCUCUUCUA GGCUUGUG

Where "X" represents stem II region of a HH ribozyme (Hertel et al., 1992 *Nucleic Acids Res.* 20 3252). The length of stem II may be ≥ 2 base-pairs.

Table V: Human KDR VEGF Receptor-Hairpin Ribozyme and Substrate Sequences

nt. Position	Hairpin Ribozyme Sequence	Substrate
11	CGACGGCC AGAA GCACCU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGGUGCU GCU GGCCGUCG
18	CACAGGGC AGAA GCCAGC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCUGGCC GUC GCCCUGUG
51	CCCACAGA AGAA GCCCGG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCGGGCC GCC UCUGUGGG
86	UGAGCCUG AGAA GAUCAA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUGAUCU GCC CAGGCUCA
318	GAGGCCAA AGAA GUUUCC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGAAACU GAC UUGGCCUC
358	AAAUGGAG AGAA GUAAUC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAUUACA GAU CUCCAUUU
510	CUGUUACC AGAA GGAACA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGUUCCU GAU GGUAACAG
623	ACAUAAUA AGAA GGUAAC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GUUACCA GUC UAUUAUGU
683	UUCCAUGA AGAA GACUCA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGAGUCC GUC UCAUGGAA
705	UUUUCUCC AGAA GAUAGU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	ACUAUCU GUU GGAGAAAA
833	CACUCCCA AGAA GGGUUU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAACCCA GUC UGGGAGUG
932	UCUUGGUC AGAA GCCCAC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GUGGGCU GAU GACCAAGA
1142	CCAUAAUC AGAA GUACAU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AUGUACU GAC GAUUAUGG
1259	UCUCACCA AGAA GGGGUG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CACCCCA GAU UGGUGAGA
1332	AUGGCAUA AGAA GUACAU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AUGUACG GUC UAUGCCAU

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1376	CUUCCUCC	AGAA	GCCAAU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AUUGGCA	GUU	GGAGGAAG
1413	GUCACUGA	AGAA	GCUUGG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCAAGCU	GUC	UCAGUGAC
1569	UUGUACAA	AGAA	GACACA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGUGUCA	GCU	UUGUACAA
1673	GCUCAGUG	AGAA	GCAUGU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	ACAUGCA	GCC	CACUGAGC
1717	AAACGUAG	AGAA	GUCUGC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCAGACA	GAU	CUACGUUU
1760	UUGGCAGA	AGAA	GUGGGC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCCCACA	GCC	UCUGCCAA
1797	UUCUUGCA	AGAA	GGUGUG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CACACCU	GUU	UGCAAGAA
1918	UUGAGCAA	AGAA	GACAUA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UAUGUCU	GCC	UUGCUCAA
1967	GGACUGUG	AGAA	GCCUGA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCAGGCA	GCU	CACAGUCC
1974	CGCUCUAG	AGAA	GUGAGC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCUCACA	GUC	CUAGAGCG
2021	UACUUGUC	AGAA	GAUUCU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGAAUCA	GAC	GACAAGUA
2084	ACCACAUG	AGAA	GUGGAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUCCACA	GAU	CAUGUGGU
2418	GGGAGUUC	AGAA	GGAUCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGAUCCA	GAU	GAACUCCC
2453	CAUCAUAA	AGAA	GUCGUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AACGACU	GCC	UUAUGAUG
2492	CUAGGUUC	AGAA	GGUCUC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAGACCG	GCU	GAACCUAG
2547	CCAAAGGC	AGAA	GCUUCA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGAAGCA	GAU	GCCUUUGG
2765	GGUAAGUG	AGAA	GGUUUC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAAACCU	GUC	CACUUACC
2914	AAAUCCAG	AGAA	GGCUGA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCAGCCA	GCU	CUGGAUUU
2993	GCUCCAAG	AGAA	GGAAGU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	ACUUCCU	GAC	CUUGGAGC

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3019	CACUUGGA	AGAA	GUAACA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGUUACA	GCU	UCCAAGUG
3165	CUGACAUA	AGAA	GGAUCU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGAUCCA	GAU	UAUGUCAG
3378	GUAGUAUA	AGAA	GGGGCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGCCCCU	GAU	UAUACUAC
3404	CCAGCAUG	AGAA	GGUACA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGUACCA	GAC	CAUGCUGG
3418	CCCGUGCC	AGAA	GUCCAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUGGACU	GCU	GGCACGGG
3575	GUGAGGUA	AGAA	GAGAGA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCUCUCU	GCC	UACCUCAC
3588	AUACAGGA	AGAA	GGUGAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUCACCU	GUU	UCCUGUAU
3689	CACUCACA	AGAA	GGCUCU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGAGCCG	GCC	UGUGAGUG
3753	UGGUUGUC	AGAA	GGGAUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAUCCCA	GAU	GACAACCA
3764	CACUGUCC	AGAA	GGUUGU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	ACAACCA	GAC	GGACAGUG
3911	GAUAUCCG	AGAA	GGUAGC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCUACCA	GUC	CGGAUAUC
3927	UCUGUGUC	AGAA	GAGUGA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCACUCC	GAU	GACACAGA
4011	AGAAUCUG	AGAA	GUGCUA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UAGCACA	GCC	CAGAUUCU
4016	GCUGGAGA	AGAA	GGGCUG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CAGCCCA	GAU	UCUCCAGC
4025	CCGUGUCA	AGAA	GGAGAA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUCUCCA	GCC	UGACACGG
4059	UCCUUUUA	AGAA	GGAGGA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCCUCCU	GUU	UAAAAGGA
4111	AAAAUCUG	AGAA	GACCUC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAGGUCU	GCU	CAGAUUUU
4116	ACUUCAAA	AGAA	GAGCAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUGCUCA	GAU	UUUGAAGU
4195	UCCCUGCA	AGAA	GAGGUC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GACCUCG	GAC	UGCAGGGA

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4210	CCUAGAAG	AGAA	GGCUCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGAGCCA	GCU	CUUCUAGG	

Table VI: Mouse *flk*-1 VEGF Receptor-Hammerhead Ribozyme and Substrate Sequence

nt. Position	HH Ribozyme Sequence	Substrate
13	CCGUACCC CUGAUGA X GAA AUUCGCCC	GGGCGAAUU GGGUACGG
18	GGGUCCCG CUGAUGA X GAA ACCCAAUU	AAUUGGGUA CGGGACCC
31	UCGACCUC CUGAUGA X GAA AGGGGGGU	ACCCCCCUC GAGGUCGA
37	AUACCGUC CUGAUGA X GAA ACCUCGAG	CUCGAGGUC GACGGUAU
44	CUUAUCGA CUGAUGA X GAA ACCGUCGA	UCGACGGUA UCGAUAAG
46	AGCUUAUC CUGAUGA X GAA AUACCGUC	GACGGUAUC GAUAAGCU
50	AUCAAGCU CUGAUGA X GAA AUCGAUAC	GUAUCGAUA AGCUUGAU
55	UCGAUAUC CUGAUGA X GAA AGCUUAUC	GAUAAGCUU GAUAUCGA
59	GAAUUCGA CUGAUGA X GAA AUCAAGCU	AGCUUGAUA UCGAAUUC
61	CCGAAUUC CUGAUGA X GAA AUAUCAAG	CUUGAUAUC GAAUUCGG
66	UGGGCCCG CUGAUGA X GAA AUUCGAUA	UAUCGAAUU CGGGCCCA
67	CUGGGCCC CUGAUGA X GAA AAUUCGAU	AUCGAAUUC GGGCCCAG
83	GGCUGCGG CUGAUGA X GAA ACACAGUC	GACUGUGUC CCGCAGCC
97	AGCCAGGU CUGAUGA X GAA AUCCCGGC	GCCGGGAUA ACCUGGCU
114	GUCCGCGG CUGAUGA X GAA AUCGGGUC	GACCCGAUU CCGCGGAC
115	UGUCCGCG CUGAUGA X GAA AAUCGGGU	ACCCGAUUC CGCGGACA
169	ACCGGGGA CUGAUGA X GAA AGCGCGGG	CCCGCGCUC UCCCCGGU
171	AGACCGGG CUGAUGA X GAA AGAGCGCG	CGCGCUCUC CCCGGUCU
178	CAGCGCAA CUGAUGA X GAA ACCGGGGA	UCCCCGGUC UUGCGCUG
180	CGCAGCGC CUGAUGA X GAA AGACCGGG	CCCGGUCUU GCGCUGCG
197	AGAGGCGG CUGAUGA X GAA AUGGCCCC	GGGGCCAUA CCGCCUCU
204	AAGUCACA CUGAUGA X GAA AGGCGGUA	UACCGCCUC UGUGACUU
212	CCGCAAAG CUGAUGA X GAA AGUCACAG	CUGUGACUU CUUUGCGG
213	CCCGCAAA CUGAUGA X GAA AAGUCACA	UGUGACUUC UUUGCGGG
215	GGCCCGCA CUGAUGA X GAA AGAAGUCA	UGACUUCUU UGCGGGCC

216	UGGCCCGC CUGAUGA X GAA AAGAAGUC	GACUUCUUU GCGGGCCA
241	CAGGCACA CUGAUGA X GAA ACUCCUUC	GAAGGAGUC UGUGCCUG
262	UGGGCACA CUGAUGA X GAA AGCCCAGU	ACUGGGCUC UGUGCCCA
306	GCGACAGC CUGAUGA X GAA AGCAGCGC	GCGCUGCUA GCUGUCGC
312	CACAGAGC CUGAUGA X GAA ACAGCUAG	CUAGCUGUC GCUCUGUG
316	GAACCACA CUGAUGA X GAA AGCGACAG	CUGUCGCUC UGUGGUUC
323	CCACGCAG CUGAUGA X GAA ACCACAGA	UCUGUGGUU CUGCGUGG
324	UCCACGCA CUGAUGA X GAA AACCACAG	CUGUGGUUC UGCGUGGA
347	AACCCACA CUGAUGA X GAA AGGCGGCU	AGCCGCCUC UGUGGGUU
355	GCCAGUCA CUGAUGA X GAA ACCCACAG	CUGUGGGUU UGACUGGC
356	CGCCAGUC CUGAUGA X GAA AACCCACA	UGUGGGUUU GACUGGCG
367	AUGGAGAA CUGAUGA X GAA AUCGCCAG	CUGGCGAUU UUCUCCAU
368	GAUGGAGA CUGAUGA X GAA AAUCGCCA	UGGCGAUUU UCUCCAUC
369	GGAUGGAG CUGAUGA X GAA AAAUCGCC	GGCGAUUUU CUCCAUCC
370	GGGAUGGA CUGAUGA X GAA AAAAUCGC	GCGAUUUUC UCCAUCCC
372	GGGGGAUG CUGAUGA X GAA AGAAAAUC	GAUUUUCUC CAUCCCCC
376	CUUGGGGG CUGAUGA X GAA AUGGAGAA	UUCUCCAUC CCCCCAAG
387	UGUGUGCU CUGAUGA X GAA AGCUUGGG	CCCAAGCUC AGCACACA
405	AUUGUCAG CUGAUGA X GAA AUGUCUUU	AAAGACAUA CUGACAAU
414	UUUGCCAA CUGAUGA X GAA AUUGUCAG	CUGACAAUU UUGGCAAA
415	AUUUGCCA CUGAUGA X GAA AAUUGUCA	UGACAAUUU UGGCAAAU
416	UAUUUGCC CUGAUGA X GAA AAAUUGUC	GACAAUUUU GGCAAAUA
424	AAGGGUUG CUGAUGA X GAA AUUUGCCA	UGGCAAAUA CAACCCUU
432	GUAAUCUG CUGAUGA X GAA AGGGUUGU	ACAACCCUU CAGAUUAC
433	AGUAAUCU CUGAUGA X GAA AAGGGUUG	CAACCCUUC AGAUUACU
438	CUGCAAGU CUGAUGA X GAA AUCUGAAG	CUUCAGAUU ACUUGCAG
439	CCUGCAAG CUGAUGA X GAA AAUCUGAA	UUCAGAUUA CUUGCAGG
442	UCCCCUGC CUGAUGA X GAA AGUAAUCU	AGAUUACUU GCAGGGGA
471	UUGGGCCA CUGAUGA X GAA AGCCAGUC	GACUGGCUU UGGCCCAA
472	AUUGGGCC CUGAUGA X GAA AAGCCAGU	ACUGGCUUU GGCCCAAU

484	AUCACGCU CUGAUGA X GAA AGCAUUGG	CCAAUGCUC AGCGUGAU
493	UUCCUCAG CUGAUGA X GAA AUCACGCU	AGCGUGAUU CUGAGGAA
494	UUUCCUCA CUGAUGA X GAA AAUCACGC	GCGUGAUUC UGAGGAAA
507	GUCACCAA CUGAUGA X GAA ACCCUUUC	GAAAGGGUA UUGGUGAC
509	CAGUCACC CUGAUGA X GAA AUACCCUU	AAGGGUAUU GGUGACUG
538	GCAGAAGA CUGAUGA X GAA ACUGUCAC	GUGACAGUA UCUUCUGC
540	UUGCAGAA CUGAUGA X GAA AUACUGUC	GACAGUAUC UUCUGCAA
542	UUUUGCAG CUGAUGA X GAA AGAUACUG	CAGUAUCUU CUGCAAAA
543	GUUUUGCA CUGAUGA X GAA AAGAUACU	AGUAUCUUC UGCAAAAC
555	GGAAUGGU CUGAUGA X GAA AGUGUUUU	AAAACACUC ACCAUUCC
561	ACCCUGGG CUGAUGA X GAA AUGGUGAG	CUCACCAUU CCCAGGGU
562	CACCCUGG CUGAUGA X GAA AAUGGUGA	UCACCAUUC CCAGGGUG
573	UCAUUUCC CUGAUGA X GAA ACCACCCU	AGGGUGGUU GGAAAUGA
583	GGCUCCAG CUGAUGA X GAA AUCAUUUC	GAAAUGAUA CUGGAGCC
593	AGCACUUG CUGAUGA X GAA AGGCUCCA	UGGAGCCUA CAAGUGCU
602	CCCGGUAC CUGAUGA X GAA AGCACUUG	CAAGUGCUC GUACCGGG
605	CGUCCCGG CUGAUGA X GAA ACGAGCAC	GUGCUCGUA CCGGGACG
615	GCUAUGUC CUGAUGA X GAA ACGUCCCG	CGGGACGUC GACAUAGC
621	GUGGAGGC CUGAUGA X GAA AUGUCGAC	GUCGACAUA GCCUCCAC
626	AAACAGUG CUGAUGA X GAA AGGCUAUG	CAUAGCCUC CACUGUUU
633	UAGACAUA CUGAUGA X GAA ACAGUGGA	UCCACUGUU UAUGUCUA
634	AUAGACAU CUGAUGA X GAA AACAGUGG	CCACUGUUU AUGUCUAU
635	CAUAGACA CUGAUGA X GAA AAACAGUG	CACUGUUUA UGUCUAUG
639	CGAACAUA CUGAUGA X GAA ACAUAAAC	GUUUAUGUC UAUGUUCG
641	CUCGAACA CUGAUGA X GAA AGACAUAA	UUAUGUCUA UGUUCGAG
645	UAAUCUCG CUGAUGA X GAA ACAUAGAC	GUCUAUGUU CGAGAUUA
646	GUAAUCUC CUGAUGA X GAA AACAUAGA	UCUAUGUUC GAGAUUAC
652	UGAUCUGU CUGAUGA X GAA AUCUCGAA	UUCGAGAUU ACAGAUCA
653	GUGAUCUG CUGAUGA X GAA AAUCUCGA	UCGAGAUUA CAGAUCAC
659	UGAAUGGU CUGAUGA X GAA AUCUGUAA	UUACAGAUC ACCAUUCA

665	AGGCGAUG	CUGAUGA	X	GAA	AUGGUGAU	AUCACCAUU	CAUCGCCU
666	GAGGCGAU	CUGAUGA	X	GAA	AAUGGUGA	UCACCAUUC	AUCGCCUC
669	ACAGAGGC	CUGAUGA	X	GAA	AUGAAUGG	CCAUUCAUC	GCCUCUGU
674	CACUGACA	CUGAUGA	X	GAA	AGGCGAUG	CAUCGCCUC	UGUCAGUG
678	UGGUCACU	CUGAUGA	X	GAA	ACAGAGGC	GCCUCUGUC	AGUGACCA
696	AUGUACAC	CUGAUGA	X	GAA	AUGCCAUG	CAUGGCAUC	GUGUACAU
701	CGGUGAUG	CUGAUGA	X	GAA	ACACGAUG	CAUCGUGUA	CAUCACCG
705	UUCUCGGU	CUGAUGA	X	GAA	AUGUACAC	GUGUACAUC	ACCGAGAA
735	CGGCAGGG	CUGAUGA	X	GAA	AUCACCAC	GUGGUGAUC	CCCUGCCG
749	UUGAAAUC	CUGAUGA	X	GAA	ACCCUCGG	CCGAGGGUC	GAUUUCAA
753	AGGUUUGA	CUGAUGA	X	GAA	AUCGACCC	GGGUCGAUU	UCAAACCU
754	GAGGUUUG	CUGAUGA	X	GAA	AAUCGACC	GGUCGAUUU	CAAACCUC
755	UGAGGUUU	CUGAUGA	X	GAA	AAAUCGAC	GUCGAUUUC	AAACCUCA
762	GACACAUU	CUGAUGA	X	GAA	AGGUUUGA	UCAAACCUC	AAUGUGUC
770	CGCAAAGA	CUGAUGA	X	GAA	ACACAUUG	CAAUGUGUC	UCUUUGCG
772	AGCGCAAA	CUGAUGA	X	GAA	AGACACAU	AUGUGUCUC	UUUGCGCU
774	CUAGCGCA	CUGAUGA	X	GAA	AGAGACAC	GUGUCUCUU	UGCGCUAG
775	CCUAGCGC	CUGAUGA	X	GAA	AAGAGACA	UGUCUCUUU	GCGCUAGG
781	UGGAUACC	CUGAUGA	X	GAA	AGCGCAAA	UUUGCGCUA	GGUAUCCA
785	UUUCUGGA	CUGAUGA	X	GAA	ACCUAGCG	CGCUAGGUA	UCCAGAAA
787	CUUUUCUG	CUGAUGA	X	GAA	AUACCUAG	CUAGGUAUC	CAGAAAAG
800	CCGGAACA	CUGAUGA	X	GAA	AUCUCUUU	AAAGAGAUU	UGUUCCGG
801	UCCGGAAC	CUGAUGA	X	GAA	AAUCUCUU	AAGAGAUUU	GUUCCGGA
804	CCAUCCGG	CUGAUGA	X	GAA	ACAAAUCU	AGAUUUGUU	CCGGAUGG
805	UCCAUCCG	CUGAUGA	X	GAA	AACAAAUC	GAUUUGUUC	CGGAUGGA
822	UCCCAGGA	CUGAUGA	X	GAA	AUUCUGUU	AACAGAAUU	UCCUGGGA
823	GUCCCAGG	CUGAUGA	X	GAA	AAUUCUGU	ACAGAAUUU	CCUGGGAC
824	UGUCCCAG	CUGAUGA	X	GAA	AAAUUCUG	CAGAAUUUC	CUGGGACA
840	GUAAAGCC	CUGAUGA	X	GAA	AUCUCGCU	AGCGAGAUA	GGCUUUAC
845	GGAGAGUA	CUGAUGA	X	GAA	AGCCUAUC	GAUAGGCUU	UACUCUCC

846	GGGAGAGU CUGAUGA X GAA AAGCCUAU	AUAGGCUUU ACUCUCCC
847	GGGGAGAG CUGAUGA X GAA AAAGCCUA	UAGGCUUUA CUCUCCCC
850	ACUGGGGA CUGAUGA X GAA AGUAAAGC	GCUUUACUC UCCCCAGU
852	UAACUGGG CUGAUGA X GAA AGAGUAAA	UUUACUCUC CCCAGUUA
859	GAUCAUGU CUGAUGA X GAA ACUGGGGA	UCCCCAGUU ACAUGAUC
860	UGAUCAUG CUGAUGA X GAA AACUGGGG	CCCCAGUUA CAUGAUCA
867	GCAUAGCU CUGAUGA X GAA AUCAUGUA	UACAUGAUC AGCUAUGC
872	UGCCGGCA CUGAUGA X GAA AGCUGAUC	GAUCAGCUA UGCCGGCA
885	UCACAGAA CUGAUGA X GAA ACCAUGCC	GGCAUGGUC UUCUGUGA
887	CCUCACAG CUGAUGA X GAA AGACCAUG	CAUGGUCUU CUGUGAGG
888	GCCUCACA CUGAUGA X GAA AAGACCAU	AUGGUCUUC UGUGAGGC
903	UCAUCAUU CUGAUGA X GAA AUCUUUGC	GCAAAGAUC AAUGAUGA
917	UAGACUGA CUGAUGA X GAA AGGUUUCA	UGAAACCUA UCAGUCUA
919	GAUAGACU CUGAUGA X GAA AUAGGUUU	AAACCUAUC AGUCUAUC
923	ACAUGAUA CUGAUGA X GAA ACUGAUAG	CUAUCAGUC UAUCAUGU
925	GUACAUGA CUGAUGA X GAA AGACUGAU	AUCAGUCUA UCAUGUAC
927	AUGUACAU CUGAUGA X GAA AUAGACUG	CAGUCUAUC AUGUACAU
932	CAACUAUG CUGAUGA X GAA ACAUGAUA	UAUCAUGUA CAUAGUUG
936	ACCACAAC CUGAUGA X GAA AUGUACAU	AUGUACAUA GUUGUGGU
939	ACAACCAC CUGAUGA X GAA ACUAUGUA	UACAUAGUU GUGGUUGU
945	UAUCCUAC CUGAUGA X GAA ACCACAAC	GUUGUGGUU GUAGGAUA
948	CUAUAUCC CUGAUGA X GAA ACAACCAC	GUGGUUGUA GGAUAUAG
953	AAAUCCUA CUGAUGA X GAA AUCCUACA	UGUAGGAUA UAGGAUUU
955	AUAAAUCC CUGAUGA X GAA AUAUCCUA	UAGGAUAUA GGAUUUAU
960	ACAUCAUA CUGAUGA X GAA AUCCUAUA	UAUAGGAUU UAUGAUGU
961	CACAUCAU CUGAUGA X GAA AAUCCUAU	AUAGGAUUU AUGAUGUG
962	UCACAUCA CUGAUGA X GAA AAAUCCUA	UAGGAUUUA UGAUGUGA
972	GGGCUCAG CUGAUGA X GAA AUCACAUC	GAUGUGAUU CUGAGCCC
973	GGGGCUCA CUGAUGA X GAA AAUCACAU	AUGUGAUUC UGAGCCCC
993	GAUAGCUC CUGAUGA X GAA AUUUCAUG	CAUGAAAUU GAGCUAUC

999	CCGGCAGA	CUGAUGA	X	GAA	AGCUCAAU	AUUGAGCUA	UCUGCCGG
1001	CUCCGGCA	CUGAUGA	X	GAA	AUAGCUCA	UGAGCUAUC	UGCCGGAG
1017	UUUAAGAC	CUGAUGA	X	GAA	AGUUUUUC	GAAAAACUU	GUCUUAAA
1020	CAAUUUAA	CUGAUGA	X	GAA	ACAAGUUU	AAACUUGUC	UUAAAUUG
1022	UACAAUUU	CUGAUGA	X	GAA	AGACAAGU	ACUUGUCUU	AAAUUGUA
1023	GUACAAUU	CUGAUGA	X	GAA	AAGACAAG	CUUGUCUUA	AAUUGUAC
1027	CGCUGUAC	CUGAUGA	X	GAA	AUUUAAGA	UCUUAAAUU	GUACAGCG
1030	UCUCGCUG	CUGAUGA	X	GAA	ACAAUUUA	UAAAUUGUA	CAGCGAGA
1047	CCCACAUU	CUGAUGA	X	GAA	AGCUCUGU	ACAGAGCUC	AAUGUGGG
1059	GUGAAAUC	CUGAUGA	X	GAA	AGCCCCAC	GUGGGGCUU	GAUUUCAC
1063	CCAGGUGA	CUGAUGA	X	GAA	AUCAAGCC	GGCUUGAUU	UCACCUGG
1064	GCCAGGUG	CUGAUGA	X	GAA	AAUCAAGC	GCUUGAUUU	CACCUGGC
1065	UGCCAGGU	CUGAUGA	X	GAA	AAAUCAAG	CUUGAUUUC	ACCUGGCA
1076	AAGGUGGA	CUGAUGA	X	GAA	AGUGCCAG	CUGGCACUC	UCCACCUU
1078	UGAAGGUG	CUGAUGA	X	GAA	AGAGUGCC	GGCACUCUC	CACCUUCA
1084	AGACUUUG	CUGAUGA	X	GAA	AGGUGGAG	CUCCACCUU	CAAAGUCU
1085	GAGACUUU	CUGAUGA	X	GAA	AAGGUGGA	UCCACCUUC	AAAGUCUC
1091	UAUGAUGA	CUGAUGA	X	GAA	ACUUUGAA	UUCAAAGUC	UCAUCAUA
1093	CUUAUGAU	CUGAUGA	X	GAA	AGACUUUG	CAAAGUCUC	AUCAUAAG
1096	CUUCUUAU	CUGAUGA	X	GAA	AUGAGACU	AGUCUCAUC	AUAAGAAG
1099	AAUCUUCU	CUGAUGA	X	GAA	AUGAUGAG	CUCAUCAUA	AGAAGAUU
1107	CGGUUUAC	CUGAUGA	X	GAA	AUCUUCUU	AAGAAGAUU	GUAAACCG
1110	UCCCGGUU	CUGAUGA	X	GAA	ACAAUCUU	AAGAUUGUA	AACCGGGA
1130	UCCCAGGA	CUGAUGA	X	GAA	AGGGUUUC	GAAACCCUU	UCCUGGGA
1131	GUCCCAGG	CUGAUGA	X	GAA	AAGGGUUU	AAACCCUUU	CCUGGGAC
1132	AGUCCCAG	CUGAUGA	X	GAA	AAAGGGUU	AACCCUUUC	CUGGGACU
1154	UGCUCAAA	CUGAUGA	X	GAA	ACAUCUUC	GAAGAUGUU	UUUGAGCA
1155	GUGCUCAA	CUGAUGA	X	GAA	AACAUCUU	AAGAUGUUU	UUGAGCAC
1156	GGUGCUCA	CUGAUGA	X	GAA	AAACAUCU	AGAUGUUUU	UGAGCACC
1157	AGGUGCUC	CUGAUGA	X	GAA	AAAACAUC	GAUGUUUUU	GAGCACCU

1166	CUAUUGUC	CUGAUGA	X	GAA	AGGUGCUC	GAGCACCUU	GACAAUAG
1173	ACACUUUC	CUGAUGA	X	GAA	AUUGUCAA	UUGACAAUA	GAAAGUGU
1205	CACAGGUG	CUGAUGA	X	GAA	AUUCCCCU	AGGGGAAUA	CACCUGUG
1215	CUGGACGC	CUGAUGA	X	GAA	ACACAGGU	ACCUGUGUA	GCGUCCAG
1220	GUCCACUG	CUGAUGA	X	GAA	ACGCUACA	UGUAGCGUC	CAGUGGAC
1236	UUUCUCUU	CUGAUGA	X	GAA	AUCAUCCG	CGGAUGAUC	AAGAGAAA
1246	AAAUGUUC	CUGAUGA	X	GAA	AUUUCUCU	AGAGAAAUA	GAACAUUU
1253	CUCGGACA	CUGAUGA	X	GAA	AUGUUCUA	UAGAACAUU	UGUCCGAG
1254	ACUCGGAC	CUGAUGA	X	GAA	AAUGUUCU	AGAACAUUU	GUCCGAGU
1257	UGAACUCG	CUGAUGA	X	GAA	ACAAAUGU	ACAUUUGUC	CGAGUUCA
1263	UUUGUGUG	CUGAUGA	X	GAA	ACUCGGAC	GUCCGAGUU	CACACAAA
1264	CUUUGUGU	CUGAUGA	X	GAA	AACUCGGA	UCCGAGUUC	ACACAAAG
1276	AGCAAUAA	CUGAUGA	X	GAA	AGGCUUUG	CAAAGCCUU	UUAUUGCU
1277	AAGCAAUA	CUGAUGA	X	GAA	AAGGCUUU	AAAGCCUUU	UAUUGCUU
1278	AAAGCAAU	CUGAUGA	X	GAA	AAAGGCUU	AAGCCUUUU	AUUGCUUU
1279	GAAAGCAA	CUGAUGA	X	GAA	AAAAGGCU	AGCCUUUUA	UUGCUUUC
1281	CCGAAAGC	CUGAUGA	X	GAA	AUAAAAGG	CCUUUUAUU	GCUUUCGG
1285	ACUACCGA	CUGAUGA	X	GAA	AGCAAUAA	UUAUUGCUU	UCGGUAGU
1286	CACUACCG	CUGAUGA	X	GAA	AAGCAAUA	UAUUGCUUU	CGGUAGUG
1287	CCACUACC	CUGAUGA	X	GAA	AAAGCAAU	AUUGCUUUC	GGUAGUGG
1291	CAUCCCAC	CUGAUGA	X	GAA	ACCGAAAG	CUUUCGGUA	GUGGGAUG
1304	CCACCAAA	CUGAUGA	X	GAA	AUUUCAUC	GAUGAAAUC	UUUGGUGG
1306	UUCCACCA	CUGAUGA	X	GAA	AGAUUUCA	UGAAAUCUU	UGGUGGAA
1307	CUUCCACC	CUGAUGA	X	GAA	AAGAUUUC	GAAAUCUUU	GGUGGAAG
1330	UCGGACUU	CUGAUGA	X	GAA	ACUGCCCA	UGGGCAGUC	AAGUCCGA
1335	GGGAUUCG	CUGAUGA	X	GAA	ACUUGACU	AGUCAAGUC	CGAAUCCC
1341	UUCACAGG	CUGAUGA	X	GAA	AUUCGGAC	GUCCGAAUC	CCUGUGAA
1352	AACUGAGA	CUGAUGA	X	GAA	ACUUCACA	UGUGAAGUA	UCUCAGUU
1354	GUAACUGA	CUGAUGA	X	GAA	AUACUUCA	UGAAGUAUC	UCAGUUAC
1356	GGGUAACU	CUGAUGA	X	GAA	AGAUACUU	AAGUAUCUC	AGUUACCC

1360	AGCUGGGU	CUGAUGA	X	GAA	ACUGAGAU	AUCUCAGUU	ACCCAGCU
1361	GAGCUGGG	CUGAUGA	X	GAA	AACUGAGA	UCUCAGUUA	CCCAGCUC
1369	GAUAUCAG	CUGAUGA	X	GAA	AGCUGGGU	ACCCAGCUC	CUGAUAUC
1375	CCAUUUGA	CUGAUGA	X	GAA	AUCAGGAG	CUCCUGAUA	UCAAAUGG
1377	UACCAUUU	CUGAUGA	X	GAA	AUAUCAGG	CCUGAUAUC	AAAUGGUA
1385	CAUUUCUG	CUGAUGA	X	GAA	ACCAUUUG	CAAAUGGUA	CAGAAAUG
1404	UUGGACUC	CUGAUGA	X	GAA	AUGGGCCU	AGGCCCAUU	GAGUCCAA
1409	UGUAGUUG	CUGAUGA	X	GAA	ACUCAAUG	CAUUGAGUC	CAACUACA
1415	UCAUUGUG	CUGAUGA	X	GAA	AGUUGGAC	GUCCAACUA	CACAAUGA
1425	UCGCCAAC	CUGAUGA	X	GAA	AUCAUUGU	ACAAUGAUU	GUUGGCGA
1428	UCAUCGCC	CUGAUGA	X	GAA	ACAAUCAU	AUGAUUGUU	GGCGAUGA
1440	AUGAUGGU	CUGAUGA	X	GAA	AGUUCAUC	GAUGAACUC	ACCAUCAU
1446	ACUUCCAU	CUGAUGA	X	GAA	AUGGUGAG	CUCACCAUC	AUGGAAGU
1478	UGACCGUG	CUGAUGA	X	GAA	AGUUUCCU	AGGAAACUA	CACGGUCA
1485	GUGAGGAU	CUGAUGA	X	GAA	ACCGUGUA	UACACGGUC	AUCCUCAC
1488	UUGGUGAG	CUGAUGA	X	GAA	AUGACCGU	ACGGUCAUC	CUCACCAA
1491	GGGUUGGU	CUGAUGA	X	GAA	AGGAUGAC	GUCAUCCUC	ACCAACCC
1503	UCCAUUGA	CUGAUGA	X	GAA	AUGGGGUU	AACCCCAUU	UCAAUGGA
1504	CUCCAUUG	CUGAUGA	X	GAA	AAUGGGGU	ACCCCAUUU	CAAUGGAG
1505	UCUCCAUU	CUGAUGA	X	GAA	AAAUGGGG	CCCCAUUUC	AAUGGAGA
1530	ACCAGAGA	CUGAUGA	X	GAA	ACCAUGUG	CACAUGGUC	UCUCUGGU
1532	CAACCAGA	CUGAUGA	X	GAA	AGACCAUG	CAUGGUCUC	UCUGGUUG
1534	CACAACCA	CUGAUGA	X	GAA	AGAGACCA	UGGUCUCUC	UGGUUGUG
1539	ACAUUCAC	CUGAUGA	X	GAA	ACCAGAGA	UCUCUGGUU	GUGAAUGU
1548	UGGGGUGG	CUGAUGA	X	GAA	ACAUUCAC	GUGAAUGUC	CCACCCCA
1560	UUCUCACC	CUGAUGA	X	GAA	AUCUGGGG	CCCCAGAUC	GGUGAGAA
1574	GCGAGAUC	CUGAUGA	X	GAA	AGGCUUUC	GAAAGCCUU	GAUCUCGC
1578	AUAGGCGA	CUGAUGA	X	GAA	AUCAAGGC	GCCUUGAUC	UCGCCUAU
1580	CCAUAGGC	CUGAUGA	X	GAA	AGAUCAAG	CUUGAUCUC	GCCUAUGG
1585	GGAAUCCA	CUGAUGA	X	GAA	AGGCGAGA	UCUCGCCUA	UGGAUUCC

1591	CUGGUAGG CUGAUGA X GAA AUCCAUAG	CUAUGGAUU CCUACCAG
1592	ACUGGUAG CUGAUGA X GAA AAUCCAUA	UAUGGAUUC CUACCAGU
1595	CAUACUGG CUGAUGA X GAA AGGAAUCC	GGAUUCCUA CCAGUAUG
1601	UGGUCCCA CUGAUGA X GAA ACUGGUAG	CUACCAGUA UGGGACCA
1619	UGCAUGUC CUGAUGA X GAA AUGUCUGC	GCAGACAUU GACAUGCA
1632	UUGGCGUA CUGAUGA X GAA ACUGUGCA	UGCACAGUC UACGCCAA
1634	GGUUGGCG CUGAUGA X GAA AGACUGUG	CACAGUCUA CGCCAACC
1645	GUGCAGGG CUGAUGA X GAA AGGGUUGG	CCAACCCUC CCCUGCAC
1659	UACCACUG CUGAUGA X GAA AUGUGGUG	CACCACAUC CAGUGGUA
1667	GCUGCCAG CUGAUGA X GAA ACCACUGG	CCAGUGGUA CUGGCAGC
1677	GCUUCUUC CUGAUGA X GAA AGCUGCCA	UGGCAGCUA GAAGAAGC
1691	GUCUGUAG CUGAUGA X GAA AGCAGGCU	AGCCUGCUC CUACAGAC
1694	CGGGUCUG CUGAUGA X GAA AGGAGCAG	CUGCUCCUA CAGACCCG
1718	UACAAGCA CUGAUGA X GAA ACGGGCUU	AAGCCCGUA UGCUUGUA
1723	UUCUUUAC CUGAUGA X GAA AGCAUACG	CGUAUGCUU GUAAAGAA
1726	CCAUUCUU CUGAUGA X GAA ACAAGCAU	AUGCUUGUA AAGAAUGG
1750	CCCCUGGA CUGAUGA X GAA AUCCUCCA	UGGAGGAUU UCCAGGGG
1751	CCCCCUGG CUGAUGA X GAA AAUCCUCC	GGAGGAUUU CCAGGGGG
1752	CCCCCCUG CUGAUGA X GAA AAAUCCUC	GAGGAUUUC CAGGGGGG
1770	GUGACUUC CUGAUGA X GAA AUCUUGUU	AACAAGAUC GAAGUCAC
1776	UUUUUGGU CUGAUGA X GAA ACUUCGAU	AUCGAAGUC ACCAAAAA
1790	UCAGGGCA CUGAUGA X GAA AUUGGUUU	AAACCAAUA UGCCCUGA
1800	UUUCCUUC CUGAUGA X GAA AUCAGGGC	GCCCUGAUU GAAGGAAA
1821	AGCGUACU CUGAUGA X GAA ACAGUUUU	AAAACUGUA AGUACGCU
1825	GACCAGCG CUGAUGA X GAA ACUUACAG	CUGUAAGUA CGCUGGUC
1833	GCUUGGAU CUGAUGA X GAA ACCAGCGU	ACGCUGGUC AUCCAAGC
1836	GCAGCUUG CUGAUGA X GAA AUGACCAG	CUGGUCAUC CAAGCUGC
1853	ACAACGCU CUGAUGA X GAA ACACGUUG	CAACGUGUC AGCGUUGU
1859	AUUUGUAC CUGAUGA X GAA ACGCUGAC	GUCAGCGUU GUACAAAU
1862	CACAUUUG CUGAUGA X GAA ACAACGCU	AGCGUUGUA CAAAUGUG

1878	GCUUUGUU	CUGAUGA	X	GAA	AUGGCUUC	GAAGCCAUC	AACAAAGC
1905	AAGGAGAU	CUGAUGA	X	GAA	ACCCUCUC	GAGAGGGUC	AUCUCCUU
1908	UGGAAGGA	CUGAUGA	X	GAA	AUGACCCU	AGGGUCAUC	UCCUUCCA
1910	CAUGGAAG	CUGAUGA	X	GAA	AGAUGACC	GGUCAUCUC	CUUCCAUG
1913	UCACAUGG	CUGAUGA	X	GAA	AGGAGAUG	CAUCUCCUU	CCAUGUGA
1914	AUCACAUG	CUGAUGA	X	GAA	AAGGAGAU	AUCUCCUUC	CAUGUGAU
1923	GGACCCCU	CUGAUGA	X	GAA	AUCACAUG	CAUGUGAUC	AGGGGUCC
1930	AAUUUCAG	CUGAUGA	X	GAA	ACCCCUGA	UCAGGGGUC	CUGAAAUU
1938	UGCACAGU	CUGAUGA	X	GAA	AUUUCAGG	CCUGAAAUU	ACUGUGCA
1939	UUGCACAG	CUGAUGA	X	GAA	AAUUUCAG	CUGAAAUUA	CUGUGCAA
1982	ACAACAGG	CUGAUGA	X	GAA	ACACACUC	GAGUGUGUC	CCUGUUGU
1988	CAGUGCAC	CUGAUGA	X	GAA	ACAGGGAC	GUCCCUGUU	GUGCACUG
2008	CUCAAACG	CUGAUGA	X	GAA	AUUUCUGU	ACAGAAAUA	CGUUUGAG
2012	GGUUCUCA	CUGAUGA	X	GAA	ACGUAUUU	AAAUACGUU	UGAGAACC
2013	AGGUUCUC	CUGAUGA	X	GAA	AACGUAUU	AAUACGUUU	GAGAACCU
2022	UACCACGU	CUGAUGA	X	GAA	AGGUUCUC	GAGAACCUC	ACGUGGUA
2030	CAAGCUUG	CUGAUGA	X	GAA	ACCACGUG	CACGUGGUA	CAAGCUUG
2037	UGUGAGCC	CUGAUGA	X	GAA	AGCUUGUA	UACAAGCUU	GGCUCACA
2042	UUGCCUGU	CUGAUGA	X	GAA	AGCCAAGC	GCUUGGCUC	ACAGGCAA
2054	UGUGGACC	CUGAUGA	X	GAA	AUGUUGCC	GGCAACAUC	GGUCCACA
2058	CCCAUGUG	CUGAUGA	X	GAA	ACCGAUGU	ACAUCGGUC	CACAUGGG
2072	GUGUGAGU	CUGAUGA	X	GAA	AUUCGCCC	GGGCGAAUC	ACUCACAC
2076	ACUGGUGU	CUGAUGA	X	GAA	AGUGAUUC	GAAUCACUC	ACACCAGU
2085	UUCUUGCA	CUGAUGA	X	GAA	ACUGGUGU	ACACCAGUU	UGCAAGAA
2086	GUUCUUGC	CUGAUGA	X	GAA	AACUGGUG	CACCAGUUU	GCAAGAAC
2096	GAGCAUCC	CUGAUGA	X	GAA	AGUUCUUG	CAAGAACUU	GGAUGCUC
2104	UUUCCAAA	CUGAUGA	X	GAA	AGCAUCCA	UGGAUGCUC	UUUGGAAA
2106	AGUUUCCA	CUGAUGA	X	GAA	AGAGCAUC	GAUGCUCUU	UGGAAACU
2107	CAGUUUCC	CUGAUGA	X	GAA	AAGAGCAU	AUGCUCUUU	GGAAACUG
2129	UGUUAGAA	CUGAUGA	X	GAA	ACAUGGUG	CACCAUGUU	UUCUAACA

2130	CUGUUAGA	CUGAUGA	X	GAA	AACAUGGU	ACCAUGUUU	UCUAACAG
2131	GCUGUUAG	CUGAUGA	X	GAA	AAACAUGG	CCAUGUUUU	CUAACAGC
2132	UGCUGUUA	CUGAUGA	X	GAA	AAAACAUG	CAUGUUUUC	UAACAGCA
2134	UGUGCUGU	CUGAUGA	X	GAA	AGAAAACA	UGUUUUCUA	ACAGCACA
2151	ACAAUCAA	CUGAUGA	X	GAA	AUGUCAUU	AAUGACAUC	UUGAUUGU
2153	CCACAAUC	CUGAUGA	X	GAA	AGAUGUCA	UGACAUCUU	GAUUGUGG
2157	AAUGCCAC	CUGAUGA	X	GAA	AUCAAGAU	AUCUUGAUU	GUGGCAUU
2165	CAUUCUGA	CUGAUGA	X	GAA	AUGCCACA	UGUGGCAUU	UCAGAAUG
2166	GCAUUCUG	CUGAUGA	X	GAA	AAUGCCAC	GUGGCAUUU	CAGAAUGC
2167	GGCAUUCU	CUGAUGA	X	GAA	AAAUGCCA	UGGCAUUUC	AGAAUGCC
2177	CCUGCAGA	CUGAUGA	X	GAA	AGGCAUUC	GAAUGCCUC	UCUGCAGG
2179	GUCCUGCA	CUGAUGA	X	GAA	AGAGGCAU	AUGCCUCUC	UGCAGGAC
2198	AGCAAACA	CUGAUGA	X	GAA	AGUCGCCU	AGGCGACUA	UGUUUGCU
2202	GCAGAGCA	CUGAUGA	X	GAA	ACAUAGUC	GACUAUGUU	UGCUCUGC
2203	AGCAGAGC	CUGAUGA	X	GAA	AACAUAGU	ACUAUGUUU	GCUCUGCU
2207	CUUGAGCA	CUGAUGA	X	GAA	AGCAAACA	UGUUUGCUC	UGCUCAAG
2212	CUUAUCUU	CUGAUGA	X	GAA	AGCAGAGC	GCUCUGCUC	AAGAUAAG
2218	GGUCUUCU	CUGAUGA	X	GAA	AUCUUGAG	CUCAAGAUA	AGAAGACC
2239	GACCAGGC	CUGAUGA	X	GAA	AUGUCUUU	AAAGACAUU	GCCUGGUC
2247	AGCUGUUU	CUGAUGA	X	GAA	ACCAGGCA	UGCCUGGUC	AAACAGCU
2256	AGGAUGAU	CUGAUGA	X	GAA	AGCUGUUU	AAACAGCUC	AUCAUCCU
2259	UCUAGGAU	CUGAUGA	X	GAA	AUGAGCUG	CAGCUCAUC	AUCCUAGA
2262	CGCUCUAG	CUGAUGA	X	GAA	AUGAUGAG	CUCAUCAUC	CUAGAGCG
2265	AUGCGCUC	CUGAUGA	X	GAA	AGGAUGAU	AUCAUCCUA	GAGCGCAU
2286	UUUCCGGU	CUGAUGA	X	GAA	AUCAUGGG	CCCAUGAUC	ACCGGAAA
2296	AUUCUCCA	CUGAUGA	X	GAA	AUUUCCGG	CCGGAAAUC	UGGAGAAU
2305	UGUUGUCU	CUGAUGA	X	GAA	AUUCUCCA	UGGAGAAUC	AGACAACA
2319	GUCUCGCC	CUGAUGA	X	GAA	AUGGUUGU	ACAACCAUU	GGCGAGAC
2331	GUCACUUC	CUGAUGA	X	GAA	AUGGUCUC	GAGACCAUU	GAAGUGAC
2341	UGCUGGGC	CUGAUGA	X	GAA	AGUCACUU	AAGUGACUU	GCCCAGCA

2351	GAUUUCCA	CUGAUGA	X	GAA	AUGCUGGG	CCCAGCAUC	UGGAAAUC
2359	UGGGGUAG	CUGAUGA	X	GAA	AUUUCCAG	CUGGAAAUC	CUACCCCA
2362	GUGUGGGG	CUGAUGA	X	GAA	AGGAUUUC	GAAAUCCUA	CCCCACAC
2373	AACCAUGU	CUGAUGA	X	GAA	AUGUGUGG	CCACACAUU	ACAUGGUU
2374	GAACCAUG	CUGAUGA	X	GAA	AAUGUGUG	CACACAUUA	CAUGGUUC
2381	UGUCUUUG	CUGAUGA	X	GAA	ACCAUGUA	UACAUGGUU	CAAAGACA
2382	UUGUCUUU	CUGAUGA	X	GAA	AACCAUGU	ACAUGGUUC	AAAGACAA
2403	GAAUCUUC	CUGAUGA	X	GAA	ACCAGGGU	ACCCUGGUA	GAAGAUUC
2410	AAUGCCUG	CUGAUGA	X	GAA	AUCUUCUA	UAGAAGAUU	CAGGCAUU
2411	CAAUGCCU	CUGAUGA	X	GAA	AAUCUUCU	AGAAGAUUC	AGGCAUUG
2418	CUCAGUAC	CUGAUGA	X	GAA	AUGCCUGA	UCAGGCAUU	GUACUGAG
2421	UCUCUCAG	CUGAUGA	X	GAA	ACAAUGCC	GGCAUUGUA	CUGAGAGA
2449	CCUGCGGA	CUGAUGA	X	GAA	AGUCAGGU	ACCUGACUA	UCCGCAGG
2451	ACCCUGCG	CUGAUGA	X	GAA	AUAGUCAG	CUGACUAUC	CGCAGGGU
2481	CAGGUGUA	CUGAUGA	X	GAA	AGGCCUCC	GGAGGCCUC	UACACCUG
2483	GGCAGGUG	CUGAUGA	X	GAA	AGAGGCCU	AGGCCUCUA	CACCUGCC
2505	CAGCCAAG	CUGAUGA	X	GAA	ACAUUGCA	UGCAAUGUC	CUUGGCUG
2508	GCACAGCC	CUGAUGA	X	GAA	AGGACAUU	AAUGUCCUU	GGCUGUGC
2532	AUUAUGAA	CUGAUGA	X	GAA	AGCGUCUC	GAGACGCUC	UUCAUAAU
2534	CUAUUAUG	CUGAUGA	X	GAA	AGAGCGUC	GACGCUCUU	CAUAAUAG
2535	UCUAUUAU	CUGAUGA	X	GAA	AAGAGCGU	ACGCUCUUC	AUAAUAGA
2538	CCUUCUAU	CUGAUGA	X	GAA	AUGAAGAG	CUCUUCAUA	AUAGAAGG
2541	GCACCUUC	CUGAUGA	X	GAA	AUUAUGAA	UUCAUAAUA	GAAGGUGC
2567	UGACUUCC	CUGAUGA	X	GAA	AGUUGGUC	GACCAACUU	GGAAGUCA
2574	AGGAUAAU	CUGAUGA	X	GAA	ACUUCCAA	UUGGAAGUC	AUUAUCCU
2577	ACGAGGAU	CUGAUGA	X	GAA	AUGACUUC	GAAGUCAUU	AUCCUCGU
2578	GACGAGGA	CUGAUGA	X	GAA	AAUGACUU	AAGUCAUUA	UCCUCGUC
2580	CCGACGAG	CUGAUGA	X	GAA	AUAAUGAC	GUCAUUAUC	CUCGUCGG
2583	GUGCCGAC	CUGAUGA	X	GAA	AGGAUAAU	AUUAUCCUC	GUCGGCAC
2586	GCAGUGCC	CUGAUGA	X	GAA	ACGAGGAU	AUCCUCGUC	GGCACUGC

2601	AACAUGGC	CUGAUGA	X	GAA	AUCACUGC	GCAGUGAUU	GCCAUGUU
2609	GCCAGAAG	CUGAUGA	X	GAA	ACAUGGCA	UGCCAUGUU	CUUCUGGC
2610	AGCCAGAA	CUGAUGA	X	GAA	AACAUGGC	GCCAUGUUC	UUCUGGCU
2612	GGAGCCAG	CUGAUGA	X	GAA	AGAACAUG	CAUGUUCUU	CUGGCUCC
2613	AGGAGCCA	CUGAUGA	X	GAA	AAGAACAU	AUGUUCUUC	UGGCUCCU
2619	ACAAGAAG	CUGAUGA	X	GAA	AGCCAGAA	UUCUGGCUC	CUUCUUGU
2622	AUGACAAG	CUGAUGA	X	GAA	AGGAGCCA	UGGCUCCUU	CUUGUCAU
2623	AAUGACAA	CUGAUGA	X	GAA	AAGGAGCC	GGCUCCUUC	UUGUCAUU
2625	ACAAUGAC	CUGAUGA	X	GAA	AGAAGGAG	CUCCUUCUU	GUCAUUGU
2628	AGGACAAU	CUGAUGA	X	GAA	ACAAGAAG	CUUCUUGUC	AUUGUCCU
2631	CGUAGGAC	CUGAUGA	X	GAA	AUGACAAG	CUUGUCAUU	GUCCUACG
2634	GUCCGUAG	CUGAUGA	X	GAA	ACAAUGAC	GUCAUUGUC	CUACGGAC
2637	ACGGUCCG	CUGAUGA	X	GAA	AGGACAAU	AUUGUCCUA	CGGACCGU
2646	GCCCGCUU	CUGAUGA	X	GAA	ACGGUCCG	CGGACCGUU	AAGCGGGC
2647	GGCCCGCU	CUGAUGA	X	GAA	AACGGUCC	GGACCGUUA	AGCGGGCC
2681	UAGACAAG	CUGAUGA	X	GAA	AGCCUGUC	GACAGGCUA	CUUGUCUA
2684	CAAUAGAC	CUGAUGA	X	GAA	AGUAGCCU	AGGCUACUU	GUCUAUUG
2687	UGACAAUA	CUGAUGA	X	GAA	ACAAGUAG	CUACUUGUC	UAUUGUCA
2689	CAUGACAA	CUGAUGA	X	GAA	AGACAAGU	ACUUGUCUA	UUGUCAUG
2691	UCCAUGAC	CUGAUGA	X	GAA	AUAGACAA	UUGUCUAUU	GUCAUGGA
2694	GGAUCCAU	CUGAUGA	X	GAA	ACAAUAGA	UCUAUUGUC	AUGGAUCC
2701	UUCAUCUG	CUGAUGA	X	GAA	AUCCAUGA	UCAUGGAUC	CAGAUGAA
2711	CCAAGGGC	CUGAUGA	X	GAA	AUUCAUCU	AGAUGAAUU	GCCCUUGG
2717	GCUCAUCC	CUGAUGA	X	GAA	AGGGCAAU	AUUGCCCUU	GGAUGAGC
2738	CAUAAGGC	CUGAUGA	X	GAA	AGCGUUCA	UGAACGCUU	GCCUUAUG
2743	GGCAUCAU	CUGAUGA	X	GAA	AGGCAAGC	GCUUGCCUU	AUGAUGCC
2744	UGGCAUCA	CUGAUGA	X	GAA	AAGGCAAG	CUUGCCUUA	UGAUGCCA
2765	CCCUGGGG	CUGAUGA	X	GAA	AUUCCCAC	GUGGGAAUU	CCCCAGGG
2766	UCCCUGGG	CUGAUGA	X	GAA	AAUUCCCA	UGGGAAUUC	CCCAGGGA
2787	GGUUUUCC	CUGAUGA	X	GAA	AGUUUCAG	CUGAAACUA	GGAAAACC

2797	GCGGCCAA	CUGAUGA	X	GAA	AGGUUUUC	GAAAACCUC	UUGGCCGC
2799	CCGCGGCC	CUGAUGA	X	GAA	AGAGGUUU	AAACCUCUU	GGCCGCGG
2813	CUUGGCCG	CUGAUGA	X	GAA	AGGCACCG	CGGUGCCUU	CGGCCAAG
2814	ACUUGGCC	CUGAUGA	X	GAA	AAGGCACC	GGUGCCUUC	GGCCAAGU
2826	UCUGCCUC	CUGAUGA	X	GAA	AUCACUUG	CAAGUGAUU	GAGGCAGA
2839	AAUUCCAA	CUGAUGA	X	GAA	AGCGUCUG	CAGACGCUU	UUGGAAUU
2840	CAAUUCCA	CUGAUGA	X	GAA	AAGCGUCU	AGACGCUUU	UGGAAUUG
2841	UCAAUUCC	CUGAUGA	X	GAA	AAAGCGUC	GACGCUUUU	GGAAUUGA
2847	GUCUUGUC	CUGAUGA	X	GAA	AUUCCAAA	UUUGGAAUU	GACAAGAC
2863	UGUUUUGC	CUGAUGA	X	GAA	AGUCGCUG	CAGCGACUU	GCAAAACA
2874	UUGACGGC	CUGAUGA	X	GAA	ACUGUUUU	AAAACAGUA	GCCGUCAA
2880	AACAUCUU	CUGAUGA	X	GAA	ACGGCUAC	GUAGCCGUC	AAGAUGUU
2888	CUUCUUUC	CUGAUGA	X	GAA	ACAUCUUG	CAAGAUGUU	GAAAGAAG
2917	GAGGGCUC	CUGAUGA	X	GAA	AUGCUCGC	GCGAGCAUC	GAGCCCUC
2925	UCAGACAU	CUGAUGA	X	GAA	AGGGCUCG	CGAGCCCUC	AUGUCUGA
2930	UGAGUUCA	CUGAUGA	X	GAA	ACAUGAGG	CCUCAUGUC	UGAACUCA
2937	AGGAUCUU	CUGAUGA	X	GAA	AGUUCAGA	UCUGAACUC	AAGAUCCU
2943	UGGAUGAG	CUGAUGA	X	GAA	AUCUUGAG	CUCAAGAUC	CUCAUCCA
2946	AUGUGGAU	CUGAUGA	X	GAA	AGGAUCUU	AAGAUCCUC	AUCCACAU
2949	CCAAUGUG	CUGAUGA	X	GAA	AUGAGGAU	AUCCUCAUC	CACAUUGG
2955	UGGUGACC	CUGAUGA	X	GAA	AUGUGGAU	AUCCACAUU	GGUCACCA
2959	GAGAUGGU	CUGAUGA	X	GAA	ACCAAUGU	ACAUUGGUC	ACCAUCUC
2965	CACAUUGA	CUGAUGA	X	GAA	AUGGUGAC	GUCACCAUC	UCAAUGUG
2967	ACCACAUU	CUGAUGA	X	GAA	AGAUGGUG	CACCAUCUC	AAUGUGGU
2982	GCGCCUAG	CUGAUGA	X	GAA	AGGUUCAC	GUGAACCUC	CUAGGCGC
2985	CAGGCGCC	CUGAUGA	X	GAA	AGGAGGUU	AACCUCCUA	GGCGCCUG
3013	CACCAUGA	CUGAUGA	X	GAA	AGGCCCUC	GAGGGCCUC	UCAUGGUG
3015	AUCACCAU	CUGAUGA	X	GAA	AGAGGCCC	GGGCCUCUC	AUGGUGAU
3024	AAUUCCAC	CUGAUGA	X	GAA	AUCACCAU	AUGGUGAUU	GUGGAAUU
3032	ACUUGCAG	CUGAUGA	X	GAA	AUUCCACA	UGUGGAAUU	CUGCAAGU

3033	AACUUGCA	CUGAUGA	X	GAA	AAUUCCAC	GUGGAAUUC	UGCAAGUU
3041	GGUUUCCA	CUGAUGA	X	GAA	ACUUGCAG	CUGCAAGUU	UGGAAACC
3042	AGGUUUCC	CUGAUGA	X	GAA	AACUUGCA	UGCAAGUUU	GGAAACCU
3051	UAAGUUGA	CUGAUGA	X	GAA	AGGUUUCC	GGAAACCUA	UCAACUUA
3053	AGUAAGUU	CUGAUGA	X	GAA	AUAGGUUU	AAACCUAUC	AACUUACU
3058	CCGUAAGU	CUGAUGA	X	GAA	AGUUGAUA	UAUCAACUU	ACUUACGG
3059	CCCGUAAG	CUGAUGA	X	GAA	AAGUUGAU	AUCAACUUA	CUUACGGG
3062	UGCCCCGU	CUGAUGA	X	GAA	AGUAAGUU	AACUUACUU	ACGGGGCA
3063	UUGCCCCG	CUGAUGA	X	GAA	AAGUAAGU	ACUUACUUA	CGGGGCAA
3083	AGGGAACA	CUGAUGA	X	GAA	AUUCAUUU	AAAUGAAUU	UGUUCCCU
3084	UAGGGAAC	CUGAUGA	X	GAA	AAUUCAUU	AAUGAAUUU	GUUCCCUA
3087	UUAUAGGG	CUGAUGA	X	GAA	ACAAAUUC	GAAUUUGUU	CCCUAUAA
3088	CUUAUAGG	CUGAUGA	X	GAA	AACAAAUU	AAUUUGUUC	CCUAUAAG
3092	UGCUCUUA	CUGAUGA	X	GAA	AGGGAACA	UGUUCCCUA	UAAGAGCA
3094	UUUGCUCU	CUGAUGA	X	GAA	AUAGGGAA	UUCCCUAUA	AGAGCAAA
3113	CCUGGCGG	CUGAUGA	X	GAA	AGCGUGCC	GGCACGCUU	CCGCCAGG
3114	CCCUGGCG	CUGAUGA	X	GAA	AAGCGUGC	GCACGCUUC	CGCCAGGG
3131	CCCCAACG	CUGAUGA	X	GAA	AGUCCUUG	CAAGGACUA	CGUUGGGG
3135	AGCUCCCC	CUGAUGA	X	GAA	ACGUAGUC	GACUACGUU	GGGGAGCU
3144	UCCACGGA	CUGAUGA	X	GAA	AGCUCCCC	GGGGAGCUC	UCCGUGGA
3146	GAUCCACG	CUGAUGA	X	GAA	AGAGCUCC	GGAGCUCUC	CGUGGAUC
3154	UCUUUUCA	CUGAUGA	X	GAA	AUCCACGG	CCGUGGAUC	UGAAAAGA
3167	UGCUGUCC	CUGAUGA	X	GAA	AGCGUCUU	AAGACGCUU	GGACAGCA
3177	CUGCUGGU	CUGAUGA	X	GAA	AUGCUGUC	GACAGCAUC	ACCAGCAG
3194	AGCUGGCA	CUGAUGA	X	GAA	AGCUCUGG	CCAGAGCUC	UGCCAGCU
3203	CAAAGCCU	CUGAUGA	X	GAA	AGCUGGCA	UGCCAGCUC	AGGCUUUG
3209	CCUCAACA	CUGAUGA	X	GAA	AGCCUGAG	CUCAGGCUU	UGUUGAGG
3210	UCCUCAAC	CUGAUGA	X	GAA	AAGCCUGA	UCAGGCUUU	GUUGAGGA
3213	UUCUCCUC	CUGAUGA	X	GAA	ACAAAGCC	GGCUUUGUU	GAGGAGAA
3224	CACUGAGC	CUGAUGA	X	GAA	AUUUCUCC	GGAGAAAUC	GCUCAGUG

3228	ACAUCACU CUGAUGA X GAA AGCGAUUU	AAAUCGCUC AGUGAUGU
3237	UCUUCCUC CUGAUGA X GAA ACAUCACU	AGUGAUGUA GAGGAAGA
3253	UUCUUCAG CUGAUGA X GAA AGCUUCUU	AAGAAGCUU CUGAAGAA
3254	GUUCUUCA CUGAUGA X GAA AAGCUUCU	AGAAGCUUC UGAAGAAC
3266	AGUCCUUG CUGAUGA X GAA ACAGUUCU	AGAACUGUA CAAGGACU
3275	AGGUCAGG CUGAUGA X GAA AGUCCUUG	CAAGGACUU CCUGACCU
3276	AAGGUCAG CUGAUGA X GAA AAGUCCUU	AAGGACUUC CUGACCUU
3284	GAUGCUCC CUGAUGA X GAA AGGUCAGG	CCUGACCUU GGAGCAUC
3292	ACAGAUGA CUGAUGA X GAA AUGCUCCA	UGGAGCAUC UCAUCUGU
3294	UAACAGAU CUGAUGA X GAA AGAUGCUC	GAGCAUCUC AUCUGUUA
3297	CUGUAACA CUGAUGA X GAA AUGAGAUG	CAUCUCAUC UGUUACAG
3301	GAAGCUGU CUGAUGA X GAA ACAGAUGA	UCAUCUGUU ACAGCUUC
3302	GGAAGCUG CUGAUGA X GAA AACAGAUG	CAUCUGUUA CAGCUUCC
3308	CCACUUGG CUGAUGA X GAA AGCUGUAA	UUACAGCUU CCAAGUGG
3309	GCCACUUG CUGAUGA X GAA AAGCUGUA	UACAGCUUC CAAGUGGC
3319	CAUGCCCU CUGAUGA X GAA AGCCACUU	AAGUGGCUA AGGGCAUG
3332	AUGCCAAG CUGAUGA X GAA ACUCCAUG	CAUGGAGUU CUUGGCAU
3333	GAUGCCAA CUGAUGA X GAA AACUCCAU	AUGGAGUUC UUGGCAUC
3335	UUGAUGCC CUGAUGA X GAA AGAACUCC	GGAGUUCUU GGCAUCAA
3341	ACUUCCUU CUGAUGA X GAA AUGCCAAG	CUUGGCAUC AAGGAAGU
3352	CCUGUGGA CUGAUGA X GAA ACACUUCC	GGAAGUGUA UCCACAGG
3354	UCCCUGUG CUGAUGA X GAA AUACACUU	AAGUGUAUC CACAGGGA
3381	GAUAGGAG CUGAUGA X GAA AUGUUUCG	CGAAACAUU CUCCUAUC
3382	CGAUAGGA CUGAUGA X GAA AAUGUUUC	GAAACAUUC UCCUAUCG
3384	UCCGAUAG CUGAUGA X GAA AGAAUGUU	AACAUUCUC CUAUCGGA
3387	UUCUCCGA CUGAUGA X GAA AGGAGAAU	AUUCUCCUA UCGGAGAA
3389	UCUUCUCC CUGAUGA X GAA AUAGGAGA	UCUCCUAUC GGAGAAGA
3405	CAGAUCUU CUGAUGA X GAA ACCACAUU	AAUGUGGUU AAGAUCUG
3406	ACAGAUCU CUGAUGA X GAA AACCACAU	AUGUGGUUA AGAUCUGU
3411	AAGUCACA CUGAUGA X GAA AUCUUAAC	GUUAAGAUC UGUGACUU

3419	CCAAGCCG	CUGAUGA	X	GAA	AGUCACAG	CUGUGACUU	CGGCUUGG
3420	GCCAAGCC	CUGAUGA	X	GAA	AAGUCACA	UGUGACUUC	GGCUUGGC
3425	CCCGGGCC	CUGAUGA	X	GAA	AGCCGAAG	CUUCGGCUU	GGCCCGGG
3438	UCUUUAUA	CUGAUGA	X	GAA	AUGUCCCG	CGGGACAUU	UAUAAAGA
3439	GUCUUUAU	CUGAUGA	X	GAA	AAUGUCCC	GGGACAUUU	AUAAAGAC
3440	GGUCUUUA	CUGAUGA	X	GAA	AAAUGUCC	GGACAUUUA	UAAAGACC
3442	CGGGUCUU	CUGAUGA	X	GAA	AUAAAUGU	ACAUUUAUA	AAGACCCG
3454	UCUGACAU	CUGAUGA	X	GAA	AUCCGGGU	ACCCGGAUU	AUGUCAGA
3455	UUCUGACA	CUGAUGA	X	GAA	AAUCCGGG	CCCGGAUUA	UGUCAGAA
3459	CCUUUUCU	CUGAUGA	X	GAA	ACAUAAUC	GAUUAUGUC	AGAAAAGG
3480	UUCAAAGG	CUGAUGA	X	GAA	AGUCGGGC	GCCCGACUC	CCUUUGAA
3484	CCACUUCA	CUGAUGA	X	GAA	AGGGAGUC	GACUCCCUU	UGAAGUGG
3485	UCCACUUC	CUGAUGA	X	GAA	AAGGGAGU	ACUCCCUUU	GAAGUGGA
3510	CUGUCAAA	CUGAUGA	X	GAA	AUGGUUUC	GAAACCAUU	UUUGACAG
3511	UCUGUCAA	CUGAUGA	X	GAA	AAUGGUUU	AAACCAUUU	UUGACAGA
3512	CUCUGUCA	CUGAUGA	X	GAA	AAAUGGUU	AACCAUUUU	UGACAGAG
3513	ACUCUGUC	CUGAUGA	X	GAA	AAAAUGGU	ACCAUUUUU	GACAGAGU
3522	AUUGUGUA	CUGAUGA	X	GAA	ACUCUGUC	GACAGAGUA	UACACAAU
3524	GAAUUGUG	CUGAUGA	X	GAA	AUACUCUG	CAGAGUAUA	CACAAUUC
3531	UCGCUCUG	CUGAUGA	X	GAA	AUUGUGUA	UACACAAUU	CAGAGCGA
3532	AUCGCUCU	CUGAUGA	X	GAA	AAUUGUGU	ACACAAUUC	AGAGCGAU
3548	CACCGAAA	CUGAUGA	X	GAA	ACCACACA	UGUGUGGUC	UUUCGGUG
3550	CACACCGA	CUGAUGA	X	GAA	AGACCACA	UGUGGUCUU	UCGGUGUG
3551	ACACACCG	CUGAUGA	X	GAA	AAGACCAC	GUGGUCUUU	CGGUGUGU
3552	AACACACC	CUGAUGA	X	GAA	AAAGACCA	UGGUCUUUC	GGUGUGUU
3560	CCCAGAGC	CUGAUGA	X	GAA	ACACACCG	CGGUGUGUU	GCUCUGGG
3564	AUUUCCCA	CUGAUGA	X	GAA	AGCAACAC	GUGUUGCUC	UGGGAAAU
3573	AAGGAAAA	CUGAUGA	X	GAA	AUUUCCCA	UGGGAAAUA	UUUUCCUU
3575	CUAAGGAA	CUGAUGA	X	GAA	AUAUUUCC	GGAAAUAUU	UUCCUUAG
3576	CCUAAGGA	CUGAUGA	X	GAA	AAUAUUUC	GAAAUAUUU	UCCUUAGG

3577	ACCUAAGG	CUGAUGA	X	GAA	AAAUAUUU	AAAUAUUUU	CCUUAGGU
3578	CACCUAAG	CUGAUGA	X	GAA	AAAAUAUU	AAUAUUUUC	CUUAGGUG
3581	AGGCACCU	CUGAUGA	X	GAA	AGGAAAAU	AUUUUCCUU	AGGUGCCU
3582	GAGGCACC	CUGAUGA	X	GAA	AAGGAAAA	UUUUCCUUA	GGUGCCUC
3590	GGUAUGGG	CUGAUGA	X	GAA	AGGCACCU	AGGUGCCUC	CCCAUACC
3596	CCCCAGGG	CUGAUGA	X	GAA	AUGGGGAG	CUCCCCAUA	CCCUGGGG
3606	UCAAUCUU	CUGAUGA	X	GAA	ACCCCAGG	CCUGGGGUC	AAGAUUGA
3612	UCUUCAUC	CUGAUGA	X	GAA	AUCUUGAC	GUCAAGAUU	GAUGAAGA
3623	UCCUACAA	CUGAUGA	X	GAA	AUUCUUCA	UGAAGAAUU	UUGUAGGA
3624	CUCCUACA	CUGAUGA	X	GAA	AAUUCUUC	GAAGAAUUU	UGUAGGAG
3625	UCUCCUAC	CUGAUGA	X	GAA	AAAUUCUU	AAGAAUUUU	GUAGGAGA
3628	CAAUCUCC	CUGAUGA	X	GAA	ACAAAAUU	AAUUUUGUA	GGAGAUUG
3635	CUUCUUUC	CUGAUGA	X	GAA	AUCUCCUA	UAGGAGAUU	GAAAGAAG
3649	CCGCAUUC	CUGAUGA	X	GAA	AGUUCCUU	AAGGAACUA	GAAUGCGG
3661	GUAGUCAG	CUGAUGA	X	GAA	AGCCCGCA	UGCGGGCUC	CUGACUAC
3668	GGGUAGUG	CUGAUGA	X	GAA	AGUCAGGA	UCCUGACUA	CACUACCC
3673	UUCUGGGG	CUGAUGA	X	GAA	AGUGUAGU	ACUACACUA	CCCCAGAA
3686	UGGUCUGG	CUGAUGA	X	GAA	ACAUUUCU	AGAAAUGUA	CCAGACCA
3734	CUGAAAAC	CUGAUGA	X	GAA	AGGGUCUC	GAGACCCUC	GUUUUCAG
3737	ACUCUGAA	CUGAUGA	X	GAA	ACGAGGGU	ACCCUCGUU	UUCAGAGU
3738	AACUCUGA	CUGAUGA	X	GAA	AACGAGGG	CCCUCGUUU	UCAGAGUU
3739	CAACUCUG	CUGAUGA	X	GAA	AAACGAGG	CCUCGUUUU	CAGAGUUG
3740	CCAACUCU	CUGAUGA	X	GAA	AAAACGAG	CUCGUUUUC	AGAGUUGG
3746	GCUCCACC	CUGAUGA	X	GAA	ACUCUGAA	UUCAGAGUU	GGUGGAGC
3757	GUUUCCCA	CUGAUGA	X	GAA	AUGCUCCA	UGGAGCAUU	UGGGAAAC
3758	GGUUUCCC	CUGAUGA	X	GAA	AAUGCUCC	GGAGCAUUU	GGGAAACC
3768	GCUUGCAG	CUGAUGA	X	GAA	AGGUUUCC	GGAAACCUC	CUGCAAGC
3803	GAACAAUA	CUGAUGA	X	GAA	AGUCUUUG	CAAAGACUA	UAUUGUUC
3805	AAGAACAA	CUGAUGA	X	GAA	AUAGUCUU	AAGACUAUA	UUGUUCUU
3807	GGAAGAAC	CUGAUGA	X	GAA	AUAUAGUC	GACUAUAUU	GUUCUUCC

3810	AUUGGAAG	CUGAUGA	X	GAA	ACAAUAUA	UAUAUUGUU	CUUCCAAU
3811	CAUUGGAA	CUGAUGA	X	GAA	AACAAUAU	AUAUUGUUC	UUCCAAUG
3813	GACAUUGG	CUGAUGA	X	GAA	AGAACAAU	AUUGUUCUU	CCAAUGUC
3814	UGACAUUG	CUGAUGA	X	GAA	AAGAACAA	UUGUUCUUC	CAAUGUCA
3821	GUGUCUCU	CUGAUGA	X	GAA	ACAUUGGA	UCCAAUGUC	AGAGACAC
3847	GAGUCCAG	CUGAUGA	X	GAA	AUCCUCUU	AAGAGGAUU	CUGGACUC
3848	AGAGUCCA	CUGAUGA	X	GAA	AAUCCUCU	AGAGGAUUC	UGGACUCU
3855	GGCAGGGA	CUGAUGA	X	GAA	AGUCCAGA	UCUGGACUC	UCCCUGCC
3857	UAGGCAGG	CUGAUGA	X	GAA	AGAGUCCA	UGGACUCUC	CCUGCCUA
3865	AGGUGAGG	CUGAUGA	X	GAA	AGGCAGGG	CCCUGCCUA	CCUCACCU
3869	AAACAGGU	CUGAUGA	X	GAA	AGGUAGGC	GCCUACCUC	ACCUGUUU
3876	AUACAGGA	CUGAUGA	X	GAA	ACAGGUGA	UCACCUGUU	UCCUGUAU
3877	CAUACAGG	CUGAUGA	X	GAA	AACAGGUG	CACCUGUUU	CCUGUAUG
3878	CCAUACAG	CUGAUGA	X	GAA	AAACAGGU	ACCUGUUUC	CUGUAUGG
3883	UUCCUCCA	CUGAUGA	X	GAA	ACAGGAAA	UUUCCUGUA	UGGAGGAA
3914	CAUAAUGG	CUGAUGA	X	GAA	AUUUGGGG	CCCCAAAUU	CCAUUAUG
3915	UCAUAAUG	CUGAUGA	X	GAA	AAUUUGGG	CCCAAAUUC	CAUUAUGA
3919	GUUGUCAU	CUGAUGA	X	GAA	AUGGAAUU	AAUUCCAUU	AUGACAAC
3920	UGUUGUCA	CUGAUGA	X	GAA	AAUGGAAU	AUUCCAUUA	UGACAACA
3939	UAAUGACU	CUGAUGA	X	GAA	AUUCCUGC	GCAGGAAUC	AGUCAUUA
3943	GAGAUAAU	CUGAUGA	X	GAA	ACUGAUUC	GAAUCAGUC	AUUAUCUC
3946	CUGGAGAU	CUGAUGA	X	GAA	AUGACUGA	UCAGUCAUU	AUCUCCAG
3947	UCUGGAGA	CUGAUGA	X	GAA	AAUGACUG	CAGUCAUUA	UCUCCAGA
3949	GUUCUGGA	CUGAUGA	X	GAA	AUAAUGAC	GUCAUUAUC	UCCAGAAC
3951	CUGUUCUG	CUGAUGA	X	GAA	AGAUAAUG	CAUUAUCUC	CAGAACAG
3961	CUUUCGCU	CUGAUGA	X	GAA	ACUGUUCU	AGAACAGUA	AGCGAAAG
3987	AAUGUUUU	CUGAUGA	X	GAA	ACACUCAC	GUGAGUGUA	AAAACAUU
3995	UAUCUUCA	CUGAUGA	X	GAA	AUGUUUUU	AAAAACAUU	UGAAGAUA
3996	AUAUCUUC	CUGAUGA	X	GAA	AAUGUUUU	AAAACAUUU	GAAGAUAU
4003	CAAUGGGA	CUGAUGA	X	GAA	AUCUUCAA	UUGAAGAUA	UCCCAUUG

4005	UCCAAUGG	CUGAUGA X GAA	AUAUCUUC	GAAGAUAUC	CCAUUGGA
4010	GUUCCUCC	CUGAUGA X GAA	AUGGGAUA	UAUCCCAUU	GGAGGAAC
4026	AUCACUUU	CUGAUGA X GAA	ACUUCUGG	CCAGAAGUA	AAAGUGAU
4035	UCAUCUGG	CUGAUGA X GAA	AUCACUUU	AAAGUGAUC	CCAGAUGA
4068	GAUGCAAG	CUGAUGA X GAA	ACCAUCCC	GGGAUGGUC	CUUGCAUC
4071	UCUGAUGC	CUGAUGA X GAA	AGGACCAU	AUGGUCCUU	GCAUCAGA
4076	GCUCUUCU	CUGAUGA X GAA	AUGCAAGG	CCUUGCAUC	AGAAGAGC
4093	GUCUUCCA	CUGAUGA X GAA	AGUUUUCA	UGAAAACUC	UGGAAGAC
4112	AUGGAGAU	CUGAUGA X GAA	AUUUGUUC	GAACAAAUU	AUCUCCAU
4113	GAUGGAGA	CUGAUGA X GAA	AAUUUGUU	AACAAAUUA	UCUCCAUC
4115	AAGAUGGA	CUGAUGA X GAA	AUAAUUUG	CAAAUUAUC	UCCAUCUU
4117	AAAAGAUG	CUGAUGA X GAA	AGAUAAUU	AAUUAUCUC	CAUCUUUU
4121	CACCAAAA	CUGAUGA X GAA	AUGGAGAU	AUCUCCAUC	UUUUGGUG
4123	UCCACCAA	CUGAUGA X GAA	AGAUGGAG	CUCCAUCUU	UUGGUGGA
4124	UUCCACCA	CUGAUGA X GAA	AAGAUGGA	UCCAUCUUU	UGGUGGAA
4125	AUUCCACC	CUGAUGA X GAA	AAAGAUGG	CCAUCUUUU	GGUGGAAU
4144	CCUGCUUU	CUGAUGA X GAA	ACUGGGCA	UGCCCAGUA	AAAGCAGG
4157	AGGCCACA	CUGAUGA X GAA	ACUCCCUG	CAGGGAGUC	UGUGGCCU
4166	AGCCUUCC	CUGAUGA X GAA	AGGCCACA	UGUGGCCUC	GGAAGGCU
4175	UCUGGUUG	CUGAUGA X GAA	AGCCUUCC	GGAAGGCUC	CAACCAGA
4193	CAGACUGG	CUGAUGA X GAA	AGCCACUG	CAGUGGCUA	CCAGUCUG
4199	GAUACCCA	CUGAUGA X GAA	ACUGGUAG	CUACCAGUC	UGGGUAUC
4205	CUGAGUGA	CUGAUGA X GAA	ACCCAGAC	GUCUGGGUA	UCACUCAG
4207	AUCUGAGU	CUGAUGA X GAA	AUACCCAG	CUGGGUAUC	ACUCAGAU
4211	UGUCAUCU	CUGAUGA X GAA	AGUGAUAC	GUAUCACUC	AGAUGACA
4235	CGCUGGAG	CUGAUGA X GAA	ACACGGUG	CACCGUGUA	CUCCAGCG
4238	CGUCGCUG	CUGAUGA X GAA	AGUACACG	CGUGUACUC	CAGCGACG
4257	AUCUUUAA	CUGAUGA X GAA	AGUCCUGC	GCAGGACUU	UUAAAGAU
4258	CAUCUUUA	CUGAUGA X GAA	AAGUCCUG	CAGGACUUU	UAAAGAUG
4259	CCAUCUUU	CUGAUGA X GAA	AAAGUCCU	AGGACUUUU	AAAGAUGG

4260	ACCAUCUU	CUGAUGA	X	GAA	AAAAGUCC	GGACUUUUA	AAGAUGGU
4281	UCAGCGUG	CUGAUGA	X	GAA	ACUGCAGC	GCUGCAGUU	CACGCUGA
4282	GUCAGCGU	CUGAUGA	X	GAA	AACUGCAG	CUGCAGUUC	ACGCUGAC
4292	UGGUCCCU	CUGAUGA	X	GAA	AGUCAGCG	CGCUGACUC	AGGGACCA
4311	CAGGAGGU	CUGAUGA	X	GAA	AGCUGCAG	CUGCAGCUC	ACCUCCUG
4316	UUAAACAG	CUGAUGA	X	GAA	AGGUGAGC	GCUCACCUC	CUGUUUAA
4321	UCCAUUUA	CUGAUGA	X	GAA	ACAGGAGG	CCUCCUGUU	UAAAUGGA
4322	UUCCAUUU	CUGAUGA	X	GAA	AACAGGAG	CUCCUGUUU	AAAUGGAA
4323	CUUCCAUU	CUGAUGA	X	GAA	AAACAGGA	UCCUGUUUA	AAUGGAAG
4336	CGGGACAG	CUGAUGA	X	GAA	ACCACUUC	GAAGUGGUC	CUGUCCCG
4341	GGAGCCGG	CUGAUGA	X	GAA	ACAGGACC	GGUCCUGUC	CCGGCUCC
4348	UGGGGGCG	CUGAUGA	X	GAA	AGCCGGGA	UCCCGGCUC	CGCCCCCA
4360	AUUUCCAG	CUGAUGA	X	GAA	AGUUGGGG	CCCCAACUC	CUGGAAAU
4369	UCUCUCGU	CUGAUGA	X	GAA	AUUUCCAG	CUGGAAAUC	ACGAGAGA
4387	GAAAAUCU	CUGAUGA	X	GAA	AGCAGCAC	GUGCUGCUU	AGAUUUUC
4388	UGAAAAUC	CUGAUGA	X	GAA	AAGCAGCA	UGCUGCUUA	GAUUUUCA
4392	CACUUGAA	CUGAUGA	X	GAA	AUCUAAGC	GCUUAGAUU	UUCAAGUG
4393	ACACUUGA	CUGAUGA	X	GAA	AAUCUAAG	CUUAGAUUU	UCAAGUGU
4394	AACACUUG	CUGAUGA	X	GAA	AAAUCUAA	UUAGAUUUU	CAAGUGUU
4395	CAACACUU	CUGAUGA	X	GAA	AAAAUCUA	UAGAUUUUC	AAGUGUUG
4402	GAAAGAAC	CUGAUGA	X	GAA	ACACUUGA	UCAAGUGUU	GUUCUUUC
4405	GUGGAAAG	CUGAUGA	X	GAA	ACAACACU	AGUGUUGUU	CUUUCCAC
4406	GGUGGAAA	CUGAUGA	X	GAA	AACAACAC	GUGUUGUUC	UUUCCACC
4408	GUGGUGGA	CUGAUGA	X	GAA	AGAACAAC	GUUGUUCUU	UCCACCAC
4409	GGUGGUGG	CUGAUGA	X	GAA	AAGAACAA	UUGUUCUUU	CCACCACC
4410	GGGUGGUG	CUGAUGA	X	GAA	AAAGAACA	UGUUCUUUC	CACCACCC
4425	AAUGUGGC	CUGAUGA	X	GAA	ACUUCCGG	CCGGAAGUA	GCCACAUU
4433	GAAAAUCA	CUGAUGA	X	GAA	AUGUGGCU	AGCCACAUU	UGAUUUUC
4434	UGAAAAUC	CUGAUGA	X	GAA	AAUGUGGC	GCCACAUUU	GAUUUUCA
4438	AAAAUGAA	CUGAUGA	X	GAA	AUCAAAUG	CAUUUGAUU	UUCAUUUU

4439	AAAAAUGA	CUGAUGA	X	GAA	AAUCAAAU	AUUUGAUUU UCAUUUUU
4440	CAAAAAUG	CUGAUGA	X	GAA	AAAUCAAA	UUUGAUUUU CAUUUUUG
4441	CCAAAAAU	CUGAUGA	X	GAA	AAAAUCAA	UUGAUUUUC AUUUUUGG
4444	CCUCCAAA	CUGAUGA	X	GAA	AUGAAAAU	AUUUUCAUU UUUGGAGG
4445	UCCUCCAA	CUGAUGA	X	GAA	AAUGAAAA	UUUUCAUUU UUGGAGGA
4446	CUCCUCCA	CUGAUGA	X	GAA	AAAUGAAA	UUUCAUUUU UGGAGGAG
4447	CCUCCUCC	CUGAUGA	X	GAA	AAAAUGAA	UUCAUUUUU GGAGGAGG
4461	UGCAGUCU	CUGAUGA	X	GAA	AGGUCCCU	AGGGACCUC AGACUGCA
4477	CUGAGGAC	CUGAUGA	X	GAA	AGCUCCUU	AAGGAGCUU GUCCUCAG
4480	GCCCUGAG	CUGAUGA	X	GAA	ACAAGCUC	GAGCUUGUC CUCAGGGC
4483	AAUGCCCU	CUGAUGA	X	GAA	AGGACAAG	CUUGUCCUC AGGGCAUU
4491	UCUCUGGA	CUGAUGA	X	GAA	AUGCCCUG	CAGGGCAUU UCCAGAGA
4492	UUCUCUGG	CUGAUGA	X	GAA	AAUGCCCU	AGGGCAUUU CCAGAGAA
4493	CUUCUCUG	CUGAUGA	X	GAA	AAAUGCCC	GGGCAUUUC CAGAGAAG
4525	GUAGAGUC	CUGAUGA	X	GAA	ACACAUUC	GAAUGUGUU GACUCUAC
4530	AGAGAGUA	CUGAUGA	X	GAA	AGUCAACA	UGUUGACUC UACUCUCU
4532	AAAGAGAG	CUGAUGA	X	GAA	AGAGUCAA	UUGACUCUA CUCUCUUU
4535	GGAAAAGA	CUGAUGA	X	GAA	AGUAGAGU	ACUCUACUC UCUUUUCC
4537	AUGGAAAA	CUGAUGA	X	GAA	AGAGUAGA	UCUACUCUC UUUUCCAU
4539	GAAUGGAA	CUGAUGA	X	GAA	AGAGAGUA	UACUCUCUU UUCCAUUC
4540	UGAAUGGA	CUGAUGA	X	GAA	AAGAGAGU	ACUCUCUUU UCCAUUCA
4541	AUGAAUGG	CUGAUGA	X	GAA	AAAGAGAG	CUCUCUUUU CCAUUCAU
4542	AAUGAAUG	CUGAUGA	X	GAA	AAAAGAGA	UCUCUUUUC CAUUCAUU
4546	UUUAAAUG	CUGAUGA	X	GAA	AUGGAAAA	UUUUCCAUU CAUUUAAA
4547	UUUUAAAU	CUGAUGA	X	GAA	AAUGGAAA	UUUCCAUUC AUUUAAAA
4550	GACUUUUA	CUGAUGA	X	GAA	AUGAAUGG	CCAUUCAUU UAAAAGUC
4551	GGACUUUU	CUGAUGA	X	GAA	AAUGAAUG	CAUUCAUUU AAAAGUCC
4552	AGGACUUU	CUGAUGA	X	GAA	AAAUGAAU	AUUCAUUUA AAAGUCCU
4558	UUAUAUAG	CUGAUGA	X	GAA	ACUUUUAA	UUAAAAGUC CUAUAUAA
4561	ACAUUAUA	CUGAUGA	X	GAA	AGGACUUU	AAAGUCCUA UAUAAUGU

4563	GCACAUUA	CUGAUGA	X	GAA	AUAGGACU	AGUCCUAUA	UAAUGUGC
4565	GGGCACAU	CUGAUGA	X	GAA	AUAUAGGA	UCCUAUAUA	AUGUGCCC
4583	GGUAGUGA	CUGAUGA	X	GAA	ACCACAGC	GCUGUGGUC	UCACUACC
4585	CUGGUAGU	CUGAUGA	X	GAA	AGACCACA	UGUGGUCUC	ACUACCAG
4589	UUAACUGG	CUGAUGA	X	GAA	AGUGAGAC	GUCUCACUA	CCAGUUAA
4595	UUUGCUUU	CUGAUGA	X	GAA	ACUGGUAG	CUACCAGUU	AAAGCAAA
4596	UUUUGCUU	CUGAUGA	X	GAA	AACUGGUA	UACCAGUUA	AAGCAAAA
4609	GUGUUUGA	CUGAUGA	X	GAA	AGUCUUUU	AAAAGACUU	UCAAACAC
4610	CGUGUUUG	CUGAUGA	X	GAA	AAGUCUUU	AAAGACUUU	CAAACACG
4611	ACGUGUUU	CUGAUGA	X	GAA	AAAGUCUU	AAGACUUUC	AAACACGU
4625	GGAGGACA	CUGAUGA	X	GAA	AGUCCACG	CGUGGACUC	UGUCCUCC
4629	UCUUGGAG	CUGAUGA	X	GAA	ACAGAGUC	GACUCUGUC	CUCCAAGA
4632	ACUUCUUG	CUGAUGA	X	GAA	AGGACAGA	UCUGUCCUC	CAAGAAGU
4654	GUUUCACA	CUGAUGA	X	GAA	AGGUGCCG	CGGCACCUC	UGUGAAAC
4668	GCCCAUUC	CUGAUGA	X	GAA	AUCCAGUU	AACUGGAUC	GAAUGGGC
4683	AACACACA	CUGAUGA	X	GAA	AGCAUUGC	GCAAUGCUU	UGUGUGUU
4684	CAACACAC	CUGAUGA	X	GAA	AAGCAUUG	CAAUGCUUU	GUGUGUUG
4691	CCAUCCUC	CUGAUGA	X	GAA	ACACACAA	UUGUGUGUU	GAGGAUGG
4709	GGCCCUGG	CUGAUGA	X	GAA	ACAUCUCA	UGAGAUGUC	CCAGGGCC
4722	GGUAGACA	CUGAUGA	X	GAA	ACUCGGCC	GGCCGAGUC	UGUCUACC
4726	CCAAGGUA	CUGAUGA	X	GAA	ACAGACUC	GAGUCUGUC	UACCUUGG
4728	CUCCAAGG	CUGAUGA	X	GAA	AGACAGAC	GUCUGUCUA	CCUUGGAG
4732	AAGCCUCC	CUGAUGA	X	GAA	AGGUAGAC	GUCUACCUU	GGAGGCUU
4740	CCUCCACA	CUGAUGA	X	GAA	AGCCUCCA	UGGAGGCUU	UGUGGAGG
4741	UCCUCCAC	CUGAUGA	X	GAA	AAGCCUCC	GGAGGCUUU	GUGGAGGA
4758	UUGGCUCA	CUGAUGA	X	GAA	AGCCCGCA	UGCGGGCUA	UGAGCCAA
4771	CCACACUU	CUGAUGA	X	GAA	ACACUUGG	CCAAGUGUU	AAGUGUGG
4772	CCCACACU	CUGAUGA	X	GAA	AACACUUG	CAAGUGUUA	AGUGUGGG
4811	CUCCGAGC	CUGAUGA	X	GAA	ACUUGCGC	GCGCAAGUC	GCUCGGAG
4815	CGCUCUCC	CUGAUGA	X	GAA	AGCGACUU	AAGUCGCUC	GGAGAGCG

4826	CAGGCUCC	CUGAUGA	X	GAA	ACCGCUCU	AGAGCGGUU	GGAGCCUG
4844	GCCAGCAC	CUGAUGA	X	GAA	AUGCAUCU	AGAUGCAUU	GUGCUGGC
4854	CUCCACCA	CUGAUGA	X	GAA	AGCCAGCA	UGCUGGCUC	UGGUGGAG
4870	CAGGCCAC	CUGAUGA	X	GAA	AGCCCACC	GGUGGGCUU	GUGGCCUG
4880	CGUUUCCU	CUGAUGA	X	GAA	ACAGGCCA	UGGCCUGUC	AGGAAACG
4908	CAAAACCA	CUGAUGA	X	GAA	ACCCUGCC	GGCAGGGUU	UGGUUUUG
4909	CCAAAACC	CUGAUGA	X	GAA	AACCCUGC	GCAGGGUUU	GGUUUUGG
4913	CCUUCCAA	CUGAUGA	X	GAA	ACCAAACC	GGUUUGGUU	UUGGAAGG
4914	ACCUUCCA	CUGAUGA	X	GAA	AACCAAAC	GUUUGGUUU	UGGAAGGU
4915	AACCUUCC	CUGAUGA	X	GAA	AAACCAAA	UUUGGUUUU	GGAAGGUU
4923	AGCACGCA	CUGAUGA	X	GAA	ACCUUCCA	UGGAAGGUU	UGCGUGCU
4924	GAGCACGC	CUGAUGA	X	GAA	AACCUUCC	GGAAGGUUU	GCGUGCUC
4932	ACUGUGAA	CUGAUGA	X	GAA	AGCACGCA	UGCGUGCUC	UUCACAGU
4934	CGACUGUG	CUGAUGA	X	GAA	AGAGCACG	CGUGCUCUU	CACAGUCG
4935	CCGACUGU	CUGAUGA	X	GAA	AAGAGCAC	GUGCUCUUC	ACAGUCGG
4941	UGUAACCC	CUGAUGA	X	GAA	ACUGUGAA	UUCACAGUC	GGGUUACA
4946	UCGCCUGU	CUGAUGA	X	GAA	ACCCGACU	AGUCGGGUU	ACAGGCGA
4947	CUCGCCUG	CUGAUGA	X	GAA	AACCCGAC	GUCGGGUUA	CAGGCGAG
4957	CCACAGGG	CUGAUGA	X	GAA	ACUCGCCU	AGGCGAGUU	CCCUGUGG
4958	GCCACAGG	CUGAUGA	X	GAA	AACUCGCC	GGCGAGUUC	CCUGUGGC
4969	GAGUAGGA	CUGAUGA	X	GAA	ACGCCACA	UGUGGCGUU	UCCUACUC
4970	GGAGUAGG	CUGAUGA	X	GAA	AACGCCAC	GUGGCGUUU	CCUACUCC
4971	AGGAGUAG	CUGAUGA	X	GAA	AAACGCCA	UGGCGUUUC	CUACUCCU
4974	AUUAGGAG	CUGAUGA	X	GAA	AGGAAACG	CGUUUCCUA	CUCCUAAU
4977	CUCAUUAG	CUGAUGA	X	GAA	AGUAGGAA	UUCCUACUC	CUAAUGAG
4980	ACUCUCAU	CUGAUGA	X	GAA	AGGAGUAG	CUACUCCUA	AUGAGAGU
4989	CCGGAAGG	CUGAUGA	X	GAA	ACUCUCAU	AUGAGAGUU	CCUUCCGG
4990	UCCGGAAG	CUGAUGA	X	GAA	AACUCUCA	UGAGAGUUC	CUUCCGGA
4993	GAGUCCGG	CUGAUGA	X	GAA	AGGAACUC	GAGUUCCUU	CCGGACUC
4994	AGAGUCCG	CUGAUGA	X	GAA	AAGGAACU	AGUUCCUUC	CGGACUCU

5001	ACACGUAA	CUGAUGA	X	GAA	AGUCCGGA	UCCGGACUC UUACGUGU
5003	AGACACGU	CUGAUGA	X	GAA	AGAGUCCG	CGGACUCUU ACGUGUCU
5004	GAGACACG	CUGAUGA	X	GAA	AAGAGUCC	GGACUCUUA CGUGUCUC
5010	GGCCAGGA	CUGAUGA	X	GAA	ACACGUAA	UUACGUGUC UCCUGGCC
5012	CAGGCCAG	CUGAUGA	X	GAA	AGACACGU	ACGUGUCUC CUGGCCUG
5046	GAAGGAGC	CUGAUGA	X	GAA	AGCUGCAU	AUGCAGCUU GCUCCUUC
5050	UGAGGAAG	CUGAUGA	X	GAA	AGCAAGCU	AGCUUGCUC CUUCCUCA
5053	AGAUGAGG	CUGAUGA	X	GAA	AGGAGCAA	UUGCUCCUU CCUCAUCU
5054	GAGAUGAG	CUGAUGA	X	GAA	AAGGAGCA	UGCUCCUUC CUCAUCUC
5057	UGAGAGAU	CUGAUGA	X	GAA	AGGAAGGA	UCCUUCCUC AUCUCUCA
5060	GCCUGAGA	CUGAUGA	X	GAA	AUGAGGAA	UUCCUCAUC UCUCAGGC
5062	CAGCCUGA	CUGAUGA	X	GAA	AGAUGAGG	CCUCAUCUC UCAGGCUG
5064	CACAGCCU	CUGAUGA	X	GAA	AGAGAUGA	UCAUCUCUC AGGCUGUG
5076	UCUGAAUU	CUGAUGA	X	GAA	AGGCACAG	CUGUGCCUU AAUUCAGA
5077	UUCUGAAU	CUGAUGA	X	GAA	AAGGCACA	UGUGCCUUA AUUCAGAA
5080	GUGUUCUG	CUGAUGA	X	GAA	AUUAAGGC	GCCUUAAUU CAGAACAC
5081	GGUGUUCU	CUGAUGA	X	GAA	AAUUAAGG	CCUUAAUUC AGAACACC
5105	CCUCUGCC	CUGAUGA	X	GAA	ACGUUCCU	AGGAACGUC GGCAGAGG
5116	CCCGUCAG	CUGAUGA	X	GAA	AGCCUCUG	CAGAGGCUC CUGACGGG
5135	GUUCUCAC	CUGAUGA	X	GAA	AUUCUUCG	CGAAGAAUU GUGAGAAC
5156	GAAACCCU	CUGAUGA	X	GAA	AGUUUCUG	CAGAAACUC AGGGUUUC
5162	CCAGCAGA	CUGAUGA	X	GAA	ACCCUGAG	CUCAGGGUU UCUGCUGG
5163	CCCAGCAG	CUGAUGA	X	GAA	AACCCUGA	UCAGGGUUU CUGCUGGG
5164	ACCCAGCA	CUGAUGA	X	GAA	AAACCCUG	CAGGGUUUC UGCUGGGU
5203	AACCCUCA	CUGAUGA	X	GAA	ACCUGCCA	UGGCAGGUC UGAGGGUU
5211	UGACAGAG	CUGAUGA	X	GAA	ACCCUCAG	CUGAGGGUU CUCUGUCA
5212	UUGACAGA	CUGAUGA	X	GAA	AACCCUCA	UGAGGGUUC UCUGUCAA
5214	ACUUGACA	CUGAUGA	X	GAA	AGAACCCU	AGGGUUCUC UGUCAAGU
5218	CGCCACUU	CUGAUGA	X	GAA	ACAGAGAA	UUCUCUGUC AAGUGGCG
5229	UGAGCCUU	CUGAUGA	X	GAA	ACCGCCAC	GUGGCGGUA AAGGCUCA

5236	ACCAGCCU	CUGAUGA	X	GAA	AGCCUUUA	UAAAGGCUC AGGCUGGU
5247	AGAGGAAG	CUGAUGA	X	GAA	ACACCAGC	GCUGGUGUU CUUCCUCU
5248	UAGAGGAA	CUGAUGA	X	GAA	AACACCAG	CUGGUGUUC UUCCUCUA
5250	GAUAGAGG	CUGAUGA	X	GAA	AGAACACC	GGUGUUCUU CCUCUAUC
5251	AGAUAGAG	CUGAUGA	X	GAA	AAGAACAC	GUGUUCUUC CUCUAUCU
5254	UGGAGAUA	CUGAUGA	X	GAA	AGGAAGAA	UUCUUCCUC UAUCUCCA
5256	AGUGGAGA	CUGAUGA	X	GAA	AGAGGAAG	CUUCCUCUA UCUCCACU
5258	GGAGUGGA	CUGAUGA	X	GAA	AUAGAGGA	UCCUCUAUC UCCACUCC
5260	CAGGAGUG	CUGAUGA	X	GAA	AGAUAGAG	CUCUAUCUC CACUCCUG
5265	CCUGACAG	CUGAUGA	X	GAA	AGUGGAGA	UCUCCACUC CUGUCAGG
5270	GGGGGCCU	CUGAUGA	X	GAA	ACAGGAGU	ACUCCUGUC AGGCCCCC
5283	AUACUGAG	CUGAUGA	X	GAA	ACUUGGGG	CCCCAAGUC CUCAGUAU
5286	AAAAUACU	CUGAUGA	X	GAA	AGGACUUG	CAAGUCCUC AGUAUUUU
5290	AGCUAAAA	CUGAUGA	X	GAA	ACUGAGGA	UCCUCAGUA UUUUAGCU
5292	AAAGCUAA	CUGAUGA	X	GAA	AUACUGAG	CUCAGUAUU UUAGCUUU
5293	CAAAGCUA	CUGAUGA	X	GAA	AAUACUGA	UCAGUAUUU UAGCUUUG
5294	ACAAAGCU	CUGAUGA	X	GAA	AAAUACUG	CAGUAUUUU AGCUUUGU
5295	CACAAAGC	CUGAUGA	X	GAA	AAAAUACU	AGUAUUUUA GCUUUGUG
5299	AAGCCACA	CUGAUGA	X	GAA	AGCUAAAA	UUUUAGCUU UGUGGCUU
5300	GAAGCCAC	CUGAUGA	X	GAA	AAGCUAAA	UUUAGCUUU GUGGCUUC
5307	CCAUCAGG	CUGAUGA	X	GAA	AGCCACAA	UUGUGGCUU CCUGAUGG
5308	GCCAUCAG	CUGAUGA	X	GAA	AAGCCACA	UGUGGCUUC CUGAUGGC
5325	CCAAUUAA	CUGAUGA	X	GAA	AUUUUUCU	AGAAAAAUC UUAAUUGG
5327	AACCAAUU	CUGAUGA	X	GAA	AGAUUUUU	AAAAAUCUU AAUUGGUU
5328	CAACCAAU	CUGAUGA	X	GAA	AAGAUUUU	AAAAUCUUA AUUGGUUG
5331	AACCAACC	CUGAUGA	X	GAA	AUUAAGAU	AUCUUAAUU GGUUGGUU
5335	AGCAAACC	CUGAUGA	X	GAA	ACCAAUUA	UAAUUGGUU GGUUUGCU
5339	GGAGAGCA	CUGAUGA	X	GAA	ACCAACCA	UGGUUGGUU UGCUCUCC
5340	UGGAGAGC	CUGAUGA	X	GAA	AACCAACC	GGUUGGUUU GCUCUCCA
5344	UAUCUGGA	CUGAUGA	X	GAA	AGCAAACC	GGUUUGCUC UCCAGAUA

5346	AUUAUCUG	CUGAUGA	X	GAA	AGAGCAAA	UUUGCUCUC	CAGAUAAU
5352	CUAGUGAU	CUGAUGA	X	GAA	AUCUGGAG	CUCCAGAUA	AUCACUAG
5355	UGGCUAGU	CUGAUGA	X	GAA	AUUAUCUG	CAGAUAAUC	ACUAGCCA
5359	AAUCUGGC	CUGAUGA	X	GAA	AGUGAUUA	UAAUCACUA	GCCAGAUU
5367	AAUUUCGA	CUGAUGA	X	GAA	AUCUGGCU	AGCCAGAUU	UCGAAAUU
5368	UAAUUUCG	CUGAUGA	X	GAA	AAUCUGGC	GCCAGAUUU	CGAAAUUA
5369	GUAAUUUC	CUGAUGA	X	GAA	AAAUCUGG	CCAGAUUUC	GAAAUUAC
5375	UAAAAAGU	CUGAUGA	X	GAA	AUUUCGAA	UUCGAAAUU	ACUUUUUA
5376	CUAAAAAG	CUGAUGA	X	GAA	AAUUUCGA	UCGAAAUUA	CUUUUUAG
5379	CGGCUAAA	CUGAUGA	X	GAA	AGUAAUUU	AAAUUACUU	UUUAGCCG
5380	UCGGCUAA	CUGAUGA	X	GAA	AAGUAAUU	AAUUACUUU	UUAGCCGA
5381	CUCGGCUA	CUGAUGA	X	GAA	AAAGUAAU	AUUACUUUU	UAGCCGAG
5382	CCUCGGCU	CUGAUGA	X	GAA	AAAAGUAA	UUACUUUUU	AGCCGAGG
5383	ACCUCGGC	CUGAUGA	X	GAA	AAAAAGUA	UACUUUUUA	GCCGAGGU
5392	GUUAUCAU	CUGAUGA	X	GAA	ACCUCGGC	GCCGAGGUU	AUGAUAAC
5393	UGUUAUCA	CUGAUGA	X	GAA	AACCUCGG	CCGAGGUUA	UGAUAACA
5398	GUAGAUGU	CUGAUGA	X	GAA	AUCAUAAC	GUUAUGAUA	ACAUCUAC
5403	AUACAGUA	CUGAUGA	X	GAA	AUGUUAUC	GAUAACAUC	UACUGUAU
5405	GGAUACAG	CUGAUGA	X	GAA	AGAUGUUA	UAACAUCUA	CUGUAUCC
5410	CUAAAGGA	CUGAUGA	X	GAA	ACAGUAGA	UCUACUGUA	UCCUUUAG
5412	UUCUAAAG	CUGAUGA	X	GAA	AUACAGUA	UACUGUAUC	CUUUAGAA
5415	AAAUUCUA	CUGAUGA	X	GAA	AGGAUACA	UGUAUCCUU	UAGAAUUU
5416	AAAAUUCU	CUGAUGA	X	GAA	AAGGAUAC	GUAUCCUUU	AGAAUUUU
5417	UAAAAUUC	CUGAUGA	X	GAA	AAAGGAUA	UAUCCUUUA	GAAUUUUA
5422	UAGGUUAA	CUGAUGA	X	GAA	AUUCUAAA	UUUAGAAUU	UUAACCUA
5423	AUAGGUUA	CUGAUGA	X	GAA	AAUUCUAA	UUAGAAUUU	UAACCUAU
5424	UAUAGGUU	CUGAUGA	X	GAA	AAAUUCUA	UAGAAUUUU	AACCUAUA
5425	UUAUAGGU	CUGAUGA	X	GAA	AAAAUUCU	AGAAUUUUA	ACCUAUAA
5430	UAGUUUUA	CUGAUGA	X	GAA	AGGUUAAA	UUUAACCUA	UAAAACUA
5432	CAUAGUUU	CUGAUGA	X	GAA	AUAGGUUA	UAACCUAUA	AAACUAUG

5438	AGUAGACA	CUGAUGA	X	GAA	AGUUUUAU	AUAAAACUA UGUCUACU
5442	AACCAGUA	CUGAUGA	X	GAA	ACAUAGUU	AACUAUGUC UACUGGUU
5444	GAAACCAG	CUGAUGA	X	GAA	AGACAUAG	CUAUGUCUA CUGGUUUC
5450	CAGGCAGA	CUGAUGA	X	GAA	ACCAGUAG	CUACUGGUU UCUGCCUG
5451	ACAGGCAG	CUGAUGA	X	GAA	AACCAGUA	UACUGGUUU CUGCCUGU
5452	CACAGGCA	CUGAUGA	X	GAA	AAACCAGU	ACUGGUUUC UGCCUGUG

Where "X" represents stem II region of a HH ribozyme (Hertel et al., 1992 *Nucleic Acids Res.* 20 3252). The length of stem II may be ≥ 2 base-pairs.

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Table VII: Mouse *flk*-1 VEGF Receptor-Hairpin Ribozyme and Substrate Sequences

nt. Posi-tion	HP Ribozyme Sequence	Substrate
74	GGGACACA AGAA GGGCCC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGGCCCA GAC UGUGUCCC
88	GUUAUCCC AGAA GCGGGA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCCCGCA GCC GGGAUAAC
105	GGAAUCGG AGAA GCCAGG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCUGGCU GAC CCGAUUCC
110	UCCGCGGA AGAA GGUCAG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUGACCC GAU UCCGCGGA
125	CGGCUGUC AGAA GUGUCC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGACACC GCU GACAGCCG
132	CCAGCCGC AGAA GUCAGC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCUGACA GCC GCGGCUGG
138	CUGGCUCC AGAA GCGGCU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGCCGCG GCU GGAGCCAG
175	CAGCGCAA AGAA GGGGAG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUCCCCG GUC UUGCGCUG
199	GUCACAGA AGAA GUAUGG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCAUACC GCC UCUGUGAC
309	CACAGAGC AGAA GCUAGC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCUAGCU GUC GCUCUGUG
342	CCCACAGA AGAA GCUCGG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCGAGCC GCC UCUGUGGG
434	UGCAAGUA AGAA GAAGGG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCCUUCA GAU UACUUGCA
630	UAGACAUA AGAA GUGGAG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUCCACU GUU UAUGUCUA
655	GAAUGGUG AGAA GUAAUC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAUUACA GAU CACCAUUC
739	CGACCCUC AGAA GGGGAU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AUCCCCU GCC GAGGGUCG

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807	CUGUUUCC AGAA GGAACA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGUUCCG	GAU	GGAAACAG
920	ACAUGAUA AGAA GAUAGG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCUAUCA	GUC	UAUCAUGU
1002	UUUUCUCC AGAA GAUAGC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCUAUCU	GCC	GGAGAAAA
1229	UCUUGAUC AGAA GUCCAC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GUGGACG	GAU	GAUCAAGA
1365	AUAUCAGG AGAA GGGUAA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUACCCA	GCU	CCUGAUAU
1556	UCUCACCG AGAA GGGGUG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CACCCCA	GAU	CGGUGAGA
1629	UUGGCGUA AGAA GUGCAU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AUGCACA	GUC	UACGCCAA
1687	UCUGUAGG AGAA GGCUUC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAAGCCU	GCU	CCUACAGA
1696	UUGGCCGG AGAA GUAGGA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCCUACA	GAC	CCGGCCAA
1796	UUCCUUCA AGAA GGGCAU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AUGCCCU	GAU	UGAAGGAA
1950	GGCUGGGC AGAA GGUUGC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCAACCU	GCU	GCCCAGCC
1953	GUUGGCUG AGAA GCAGGU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	ACCUGCU	GCC	CAGCCAAC
1985	CAGUGCAC AGAA GGGACA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGUCCCU	GUU	GUGCACUG
2055	CCCAUGUG AGAA GAUGUU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AACAUCG	GUC	CACAUGGG
2082	UUCUUGCA AGAA GGUGUG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CACACCA	GUU	UGCAAGAA
2208	UUAUCUUG AGAA GAGCAA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUGCUCU	GCU	CAAGAUAA
2252	GGAUGAUG AGAA GUUUGA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCAAACA	GCU	CAUCAUCC
2444	UGCGGAUA AGAA GGUUCC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGAACCU	GAC	UAUCCGCA
2639	GCUUAACG AGAA GUAGGA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCCUACG	GAC	CGUUAAGC

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2703	GGCAAUUC	AGAA	GGAUCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGAUCCA	GAU	GAAUUGCC
2777	CUAGUUUC	AGAA	GGUCCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGGACCG	GCU	GAAACUAG
2832	CCAAAAGC	AGAA	GCCUCA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGAGGCA	GAC	GCUUUUGG
3199	AAAGCCUG	AGAA	GGCAGA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCUGCCA	GCU	CAGGCUUU
3278	GCUCCAAG	AGAA	GGAAGU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	ACUUCCU	GAC	CUUGGAGC
3304	CACUUGGA	AGAA	GUAACA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGUUACA	GCU	UCCAAGUG
3421	CCGGGCCA	AGAA	GAAGUC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GACUUCG	GCU	UGGCCCGG
3450	CUGACAUA	AGAA	GGGUCU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGACCCG	GAU	UAUGUCAG
3475	CAAAGGGA	AGAA	GGCAUC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAUGCCC	GAC	UCCCUUUG
3663	GUAGUGUA	AGAA	GGAGCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGCUCCU	GAC	UACACUAC
3689	CCAGCAUG	AGAA	GGUACA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGUACCA	GAC	CAUGCUGG
3703	CUCAUGCC	AGAA	GUCCAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUGGACU	GCU	GGCAUGAG
3860	GUGAGGUA	AGAA	GGGAGA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCUCCCU	GCC	UACCUCAC
3873	AUACAGGA	AGAA	GGUGAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUCACCU	GUU	UCCUGUAU
4038	UGGCUGUC	AGAA	GGGAUC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAUCCCA	GAU	GACAGCCA
4181	AGCCACUG	AGAA	GGUUGG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCAACCA	GAC	CAGUGGCU
4196	GAUACCCA	AGAA	GGUAGC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCUACCA	GUC	UGGGUAUC
4212	UCUGUGUC	AGAA	GAGUGA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCACUCA	GAU	GACACAGA
4278	UCAGCGUG	AGAA	GCAGCA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGCUGCA	GUU	CACGCUGA

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4287	GUCCCUGA	AGAA	GCGUGA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCACGCU	GAC	UCAGGGAC
4307	AGGAGGUG	AGAA	GCAGUG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CACUGCA	GCU	CACCUCCU
4318	UCCAUUUA	AGAA	GGAGGU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	ACCUCCU	GUU	UAAAUGGA
4338	GGAGCCGG	AGAA	GGACCA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGGUCCU	GUC	CCGGCUCC
4344	GGGGGCGG	AGAA	GGGACA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGUCCCG	GCU	CCGCCCCC
4349	GAGUUGGG	AGAA	GAGCCG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CGGCUCC	GCC	CCCAACUC
4383	AAAAUCUA	AGAA	GCACCU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGGUGCU	GCU	UAGAUUUU
4462	UCCUUGCA	AGAA	GAGGUC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GACCUCA	GAC	UGCAAGGA
4574	GAGACCAC	AGAA	GGGCAC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GUGCCCU	GCU	GUGGUCUC
4626	UCUUGGAG	AGAA	GAGUCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGACUCU	GUC	CUCCAAGA
4723	CCAAGGUA	AGAA	GACUCG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CGAGUCU	GUC	UACCUUGG
4823	CAGGCUCC	AGAA	GCUCUC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAGAGCG	GUU	GGAGCCUG
4836	CACAAUGC	AGAA	GCAGGC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCCUGCA	GAU	GCAUUGUG
4896	ACCCUGCC	AGAA	GCCUUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAAGGCG	GCC	GGCAGGGU
4938	UGUAACCC	AGAA	GUGAAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUUCACA	GUC	GGGUUACA
4996	ACGUAAGA	AGAA	GGAAGG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCUUCCG	GAC	UCUUACGU
5042	AAGGAGCA	AGAA	GCAUCA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGAUGCA	GCU	UGCUCCUU
5118	UCGGCCCC	AGAA	GGAGCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGCUCCU	GAC	GGGGCCGA
5165	CUCCACCC	AGAA	GAAACC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGUUUCU	GCU	GGGUGGAG

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5310	UUUCUGCC AGAA GGAAGC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCUUCCU GAU GGCAGAAA
5363	AUUUCGAA AGAA GGCUAG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUAGCCA GAU UUCGAAAU
5453	AGCACACA AGAA GAAACC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGUUUCU GCC UGUGUGCU

Table VIII: Mouse *flt-1* VEGF Receptor-Hammerhead Ribozyme and Substrate Sequence

nt. Posi-tion	HH Ribozyme Sequence	Substrate
17	GUGAGCAA CUGAUGA X GAA ACGCGGCC	GGCCGCGUC UUGCUCAC
19	UGGUGAGC CUGAUGA X GAA AGACGCGG	CCGCGUCUU GCUCACCA
23	ACCAUGGU CUGAUGA X GAA AGCAAGAC	GUCUUGCUC ACCAUGGU
32	CAGCAGCU CUGAUGA X GAA ACCAUGGU	ACCAUGGUC AGCUGCUG
53	UAAGGCAA CUGAUGA X GAA ACCGCGGU	ACCGCGGUC UUGCCUUA
55	CGUAAGGC CUGAUGA X GAA AGACCGCG	CGCGGUCUU GCCUUACG
60	CAGCGCGU CUGAUGA X GAA AGGCAAGA	UCUUGCCUU ACGCGCUG
61	GCAGCGCG CUGAUGA X GAA AAGGCAAG	CUUGCCUUA CGCGCUGC
71	AGACACCC CUGAUGA X GAA AGCAGCGC	GCGCUGCUC GGGUGUCU
78	GAGAAGCA CUGAUGA X GAA ACACCCGA	UCGGGUGUC UGCUUCUC
83	CCUGUGAG CUGAUGA X GAA AGCAGACA	UGUCUGCUU CUCACAGG
84	UCCUGUGA CUGAUGA X GAA AAGCAGAC	GUCUGCUUC UCACAGGA
86	UAUCCUGU CUGAUGA X GAA AGAAGCAG	CUGCUUCUC ACAGGAUA
94	CUGAGCCA CUGAUGA X GAA AUCCUGUG	CACAGGAUA UGGCUCAG
100	UCGACCCU CUGAUGA X GAA AGCCAUAU	AUAUGGCUC AGGGUCGA
106	UUAACUUC CUGAUGA X GAA ACCCUGAG	CUCAGGGUC GAAGUUAA
112	GCACUUUU CUGAUGA X GAA ACUUCGAC	GUCGAAGUU AAAAGUGC
113	GGCACUUU CUGAUGA X GAA AACUUCGA	UCGAAGUUA AAAGUGCC
132	GCCUUUUA CUGAUGA X GAA ACUCAGUU	AACUGAGUU UAAAAGGC
133	UGCCUUUU CUGAUGA X GAA AACUCAGU	ACUGAGUUU AAAAGGCA
134	GUGCCUUU CUGAUGA X GAA AAACUCAG	CUGAGUUUA AAAGGCAC
152	GCUUGCAU CUGAUGA X GAA ACAUGCUG	CAGCAUGUC AUGCAAGC
171	GAGAAAGA CUGAUGA X GAA AGUCUGGC	GCCAGACUC UCUUUCUC
173	UUGAGAAA CUGAUGA X GAA AGAGUCUG	CAGACUCUC UUUCUCAA
175	ACUUGAGA CUGAUGA X GAA AGAGAGUC	GACUCUCUU UCUCAAGU
176	CACUUGAG CUGAUGA X GAA AAGAGAGU	ACUCUCUUU CUCAAGUG
177	GCACUUGA CUGAUGA X GAA AAAGAGAG	CUCUCUUUC UCAAGUGC

179	CUGCACUU CUGAUGA X GAA AGAAAGAG	CUCUUUCUC AAGUGCAG
205	GAGACCAU CUGAUGA X GAA AGUGGGCU	AGCCCACUC AUGGUCUC
211	UGGGCAGA CUGAUGA X GAA ACCAUGAG	CUCAUGGUC UCUGCCCA
213	CGUGGGCA CUGAUGA X GAA AGACCAUG	CAUGGUCUC UGCCCACG
254	GGGGGAGU CUGAUGA X GAA AUGCUCAG	CUGAGCAUC ACUCCCCC
258	CGAUGGGG CUGAUGA X GAA AGUGAUGC	GCAUCACUC CCCCAUCG
265	CACAGGCC CUGAUGA X GAA AUGGGGGA	UCCCCCAUC GGCCUGUG
282	UUGCCUGU CUGAUGA X GAA AUCCCUCC	GGAGGGAUA ACAGGCAA
292	UGCUGCAG CUGAUGA X GAA AUUGCCUG	CAGGCAAUU CUGCAGCA
293	GUGCUGCA CUGAUGA X GAA AAUUGCCU	AGGCAAUUC UGCAGCAC
304	CCAAGGUC CUGAUGA X GAA AGGUGCUG	CAGCACCUU GACCUUGG
310	CCGUGUCC CUGAUGA X GAA AGGUCAAG	CUUGACCUU GGACACGG
341	CAGGUGUA CUGAUGA X GAA AGGCCCGU	ACGGGCCUC UACACCUG
343	UACAGGUG CUGAUGA X GAA AGAGGCCC	GGGCCUCUA CACCUGUA
351	GAGGUAUC CUGAUGA X GAA ACAGGUGU	ACACCUGUA GAUACCUC
355	UAGGGAGG CUGAUGA X GAA AUCUACAG	CUGUAGAUA CCUCCCUA
359	GAUGUAGG CUGAUGA X GAA AGGUAUCU	AGAUACCUC CCUACAUC
363	AGUAGAUG CUGAUGA X GAA AGGGAGGU	ACCUCCCUA CAUCUACU
367	UCGAAGUA CUGAUGA X GAA AUGUAGGG	CCCUACAUC UACUUCGA
369	CUUCGAAG CUGAUGA X GAA AGAUGUAG	CUACAUCUA CUUCGAAG
372	UUUCUUCG CUGAUGA X GAA AGUAGAUG	CAUCUACUU CGAAGAAA
373	UUUUCUUC CUGAUGA X GAA AAGUAGAU	AUCUACUUC GAAGAAAA
394	AGAUUGAA CUGAUGA X GAA AUUCCGCU	AGCGGAAUC UUCAAUCU
396	GUAGAUUG CUGAUGA X GAA AGAUUCCG	CGGAAUCUU CAAUCUAC
397	UGUAGAUU CUGAUGA X GAA AAGAUUCC	GGAAUCUUC AAUCUACA
401	AAUAUGUA CUGAUGA X GAA AUUGAAGA	UCUUCAAUC UACAUAUU
403	CAAAUAUG CUGAUGA X GAA AGAUUGAA	UUCAAUCUA CAUAUUUG
407	CUAACAAA CUGAUGA X GAA AUGUAGAU	AUCUACAUA UUUGUUAG
409	CACUAACA CUGAUGA X GAA AUAUGUAG	CUACAUAUU UGUUAGUG
410	UCACUAAC CUGAUGA X GAA AAUAUGUA	UACAUAUUU GUUAGUGA
413	GCAUCACU CUGAUGA X GAA ACAAAUAU	AUAUUUGUU AGUGAUGC
414	UGCAUCAC CUGAUGA X GAA AACAAAUA	UAUUUGUUA GUGAUGCA
429	UAUGAAAG CUGAUGA X GAA ACUCCCUG	CAGGGAGUC CUUUCAUA

432	CUCUAUGA CUGAUGA X GAA AGGACUCC	GGAGUCCUU UCAUAGAG
433	UCUCUAUG CUGAUGA X GAA AAGGACUC	GAGUCCUUU CAUAGAGA
434	AUCUCUAU CUGAUGA X GAA AAAGGACU	AGUCCUUUC AUAGAGAU
437	UGCAUCUC CUGAUGA X GAA AUGAAAGG	CCUUUCAUA GAGAUGCA
455	AGUUUGGG CUGAUGA X GAA AUGUCAGU	ACUGACAUA CCCAAACU
464	AUGUGCAC CUGAUGA X GAA AGUUUGGG	CCCAAACUU GUGCACAU
491	GGGAUGAU CUGAUGA X GAA AGCUGUCU	AGACAGCUC AUCAUCCC
494	CAGGGGAU CUGAUGA X GAA AUGAGCUG	CAGCUCAUC AUCCCCUG
497	CGGCAGGG CUGAUGA X GAA AUGAUGAG	CUCAUCAUC CCCUGCCG
514	CGUUGGGU CUGAUGA X GAA ACGUCACC	GGUGACGUC ACCCAACG
524	GUGACUGU CUGAUGA X GAA ACGUUGGG	CCCAACGUC ACAGUCAC
530	UUUAGGGU CUGAUGA X GAA ACUGUGAC	GUCACAGUC ACCCUAAA
536	AACUUUUU CUGAUGA X GAA AGGGUGAC	GUCACCCUA AAAAAGUU
544	CAAAUGGA CUGAUGA X GAA ACUUUUUU	AAAAAAGUU UCCAUUUG
545	UCAAAUGG CUGAUGA X GAA AACUUUUU	AAAAAGUUU CCAUUUGA
546	AUCAAAUG CUGAUGA X GAA AAACUUUU	AAAAGUUUC CAUUUGAU
550	GAGUAUCA CUGAUGA X GAA AUGGAAAC	GUUUCCAUU UGAUACUC
551	AGAGUAUC CUGAUGA X GAA AAUGGAAA	UUUCCAUUU GAUACUCU
555	GGUAAGAG CUGAUGA X GAA AUCAAAUG	CAUUUGAUA CUCUUACC
558	AGGGGUAA CUGAUGA X GAA AGUAUCAA	UUGAUACUC UUACCCCU
560	UCAGGGGU CUGAUGA X GAA AGAGUAUC	GAUACUCUU ACCCCUGA
561	AUCAGGGG CUGAUGA X GAA AAGAGUAU	AUACUCUUA CCCCUGAU
581	UCCCAUGU CUGAUGA X GAA AUUCUUUG	CAAAGAAUA ACAUGGGA
594	GCCUCUCC CUGAUGA X GAA ACUGUCCC	GGGACAGUA GGAGAGGC
604	CUAUUAUA CUGAUGA X GAA AGCCUCUC	GAGAGGCUU UAUAAUAG
605	GCUAUUAU CUGAUGA X GAA AAGCCUCU	AGAGGCUUU AUAAUAGC
606	UGCUAUUA CUGAUGA X GAA AAAGCCUC	GAGGCUUUA UAAUAGCA
608	UUUGCUAU CUGAUGA X GAA AUAAAGCC	GGCUUUAUA AUAGCAAA
611	GCAUUUGC CUGAUGA X GAA AUUAUAAA	UUUAUAAUA GCAAAUGC
625	UCUCUUUG CUGAUGA X GAA ACGUUGCA	UGCAACGUA CAAAGAGA
635	AGCAGUCC CUGAUGA X GAA AUCUCUUU	AAAGAGAUA GGACUGCU
662	UGCCCGUU CUGAUGA X GAA ACGGUGGC	GCCACCGUC AACGGGCA
676	UUGUCUGG CUGAUGA X GAA ACAGGUGC	GCACCUGUA CCAGACAA

688	GGGUCAGA	CUGAUGA	X	GAA	AGUUUGUC	GACAAACUA UCUGACCC
690	AUGGGUCA	CUGAUGA	X	GAA	AUAGUUUG	CAAACUAUC UGACCCAU
699	GGUCUGCC	CUGAUGA	X	GAA	AUGGGUCA	UGACCCAUC GGCAGACC
711	UAGGAUUG	CUGAUGA	X	GAA	AUUGGUCU	AGACCAAUA CAAUCCUA
716	ACAUCUAG	CUGAUGA	X	GAA	AUUGUAUU	AAUACAAUC CUAGAUGU
719	UGGACAUC	CUGAUGA	X	GAA	AGGAUUGU	ACAAUCCUA GAUGUCCA
725	CGUAUUUG	CUGAUGA	X	GAA	ACAUCUAG	CUAGAUGUC CAAAUACG
731	GGCGGGCG	CUGAUGA	X	GAA	AUUUGGAC	GUCCAAAUA CGCCCGCC
758	UGCCCGUG	CUGAUGA	X	GAA	AGCAGUCU	AGACUGCUC CACGGGCA
771	GAGGACAA	CUGAUGA	X	GAA	AGUCUGCC	GGCAGACUC UUGUCCUC
773	UUGAGGAC	CUGAUGA	X	GAA	AGAGUCUG	CAGACUCUU GUCCUCAA
776	CAGUUGAG	CUGAUGA	X	GAA	ACAAGAGU	ACUCUUGUC CUCAACUG
779	GUGCAGUU	CUGAUGA	X	GAA	AGGACAAG	CUUGUCCUC AACUGCAC
803	CUCGUAUU	CUGAUGA	X	GAA	AGCUCCGU	ACGGAGCUC AAUACGAG
807	CACCCUCG	CUGAUGA	X	GAA	AUUGAGCU	AGCUCAAUA CGAGGGUG
831	ACCAGGGU	CUGAUGA	X	GAA	AUUCCAGC	GCUGGAAUU ACCCUGGU
832	UACCAGGG	CUGAUGA	X	GAA	AAUUCCAG	CUGGAAUUA CCCUGGUA
840	AGUUGCUU	CUGAUGA	X	GAA	ACCAGGGU	ACCCUGGUA AAGCAACU
849	UGCUCUCU	CUGAUGA	X	GAA	AGUUGCUU	AAGCAACUA AGAGAGCA
859	GCCUUAUA	CUGAUGA	X	GAA	AUGCUCUC	GAGAGCAUC UAUAAGGC
861	CUGCCUUA	CUGAUGA	X	GAA	AGAUGCUC	GAGCAUCUA UAAGGCAG
863	CGCUGCCU	CUGAUGA	X	GAA	AUAGAUGC	GCAUCUAUA AGGCAGCG
875	CUCCGGUC	CUGAUGA	X	GAA	AUCCGCUG	CAGCGGAUU GACCGGAG
888	GUUGUGGG	CUGAUGA	X	GAA	AUGGCUCC	GGAGCCAUU CCCACAAC
889	UGUUGUGG	CUGAUGA	X	GAA	AAUGGCUC	GAGCCAUUC CCACAACA
904	CACUGUGG	CUGAUGA	X	GAA	ACACAUUG	CAAUGUGUU CCACAGUG
905	ACACUGUG	CUGAUGA	X	GAA	AACACAUU	AAUGUGUUC CACAGUGU
914	AUCUUAAG	CUGAUGA	X	GAA	ACACUGUG	CACAGUGUU CUUAAGAU
915	GAUCUUAA	CUGAUGA	X	GAA	AACACUGU	ACAGUGUUC UUAAGAUC
917	UUGAUCUU	CUGAUGA	X	GAA	AGAACACU	AGUGUUCUU AAGAUCAA
918	GUUGAUCU	CUGAUGA	X	GAA	AAGAACAC	GUGUUCUUA AGAUCAAC
923	ACAUUGUU	CUGAUGA	X	GAA	AUCUUAAG	CUUAAGAUC AACAAUGU
953	CAGGUGUA	CUGAUGA	X	GAA	AGCCCCUU	AAGGGGCUC UACACCUG

955	GACAGGUG CUGAUGA X GAA AGAGCCCC	GGGGCUCUA CACCUGUC
963	CUUCACGC CUGAUGA X GAA ACAGGUGU	ACACCUGUC GCGUGAAG
979	GGAACGAG CUGAUGA X GAA ACCCACUC	GAGUGGGUC CUCGUUCC
982	ACUGGAAC CUGAUGA X GAA AGGACCCA	UGGGUCCUC GUUCCAGU
985	AAGACUGG CUGAUGA X GAA ACGAGGAC	GUCCUCGUU CCAGUCUU
986	AAAGACUG CUGAUGA X GAA AACGAGGA	UCCUCGUUC CAGUCUUU
991	UGUUGAAA CUGAUGA X GAA ACUGGAAC	GUUCCAGUC UUUCAACA
993	GGUGUUGA CUGAUGA X GAA AGACUGGA	UCCAGUCUU UCAACACC
994	AGGUGUUG CUGAUGA X GAA AAGACUGG	CCAGUCUUU CAACACCU
995	GAGGUGUU CUGAUGA X GAA AAAGACUG	CAGUCUUUC AACACCUC
1003	CAUGCACG CUGAUGA X GAA AGGUGUUG	CAACACCUC CGUGCAUG
1015	CUUUUUCA CUGAUGA X GAA ACACAUGC	GCAUGUGUA UGAAAAAG
1027	CACUGAUG CUGAUGA X GAA AUCCUUUU	AAAAGGAUU CAUCAGUG
1028	ACACUGAU CUGAUGA X GAA AAUCCUUU	AAAGGAUUC AUCAGUGU
1031	UUCACACU CUGAUGA X GAA AUGAAUCC	GGAUUCAUC AGUGUGAA
1044	CUGCUUCC CUGAUGA X GAA AUGUUUCA	UGAAACAUC GGAAGCAG
1084	GCCGAUAG CUGAUGA X GAA ACCGUCUU	AAGACGGUC CUAUCGGC
1087	ACAGCCGA CUGAUGA X GAA AGGACCGU	ACGGUCCUA UCGGCUGU
1089	GGACAGCC CUGAUGA X GAA AUAGGACC	GGUCCUAUC GGCUGUCC
1096	CUUUCAUG CUGAUGA X GAA ACAGCCGA	UCGGCUGUC CAUGAAAG
1114	GGGAGGGG CUGAUGA X GAA AGGCCUUC	GAAGGCCUU CCCCUCCC
1115	GGGGAGGG CUGAUGA X GAA AAGGCCUU	AAGGCCUUC CCCUCCCC
1120	UUUCUGGG CUGAUGA X GAA AGGGGAAG	CUUCCCCUC CCCAGAAA
1130	AACCAUAC CUGAUGA X GAA AUUUCUGG	CCAGAAAUC GUAUGGUU
1133	UUUAACCA CUGAUGA X GAA ACGAUUUC	GAAAUCGUA UGGUUAAA
1138	CAUCUUUU CUGAUGA X GAA ACCAUACG	CGUAUGGUU AAAAGAUG
1139	CCAUCUUU CUGAUGA X GAA AACCAUAC	GUAUGGUUA AAAGAUGG
1150	UUGCAGGC CUGAUGA X GAA AGCCAUCU	AGAUGGCUC GCCUGCAA
1162	CAGACUUC CUGAUGA X GAA AUGUUGCA	UGCAACAUU GAAGUCUG
1168	AGCGAGCA CUGAUGA X GAA ACUUCAAU	AUUGAAGUC UGCUCGCU
1173	CAAAUAGC CUGAUGA X GAA AGCAGACU	AGUCUGCUC GCUAUUUG
1177	GUACCAAA CUGAUGA X GAA AGCGAGCA	UGCUCGCUA UUUGGUAC
1179	AUGUACCA CUGAUGA X GAA AUAGCGAG	CUCGCUAUU UGGUACAU

1180	CAUGUACC	CUGAUGA	X	GAA	AAUAGCGA	UCGCUAUUU	GGUACAUG
1184	UAGCCAUG	CUGAUGA	X	GAA	ACCAAAUA	UAUUUGGUA	CAUGGCUA
1192	UUAAUGAG	CUGAUGA	X	GAA	AGCCAUGU	ACAUGGCUA	CUCAUUAA
1195	UAAUUAAU	CUGAUGA	X	GAA	AGUAGCCA	UGGCUACUC	AUUAAUUA
1198	UGAUAAUU	CUGAUGA	X	GAA	AUGAGUAG	CUACUCAUU	AAUUAUCA
1199	UUGAUAAU	CUGAUGA	X	GAA	AAUGAGUA	UACUCAUUA	AUUAUCAA
1202	UCUUUGAU	CUGAUGA	X	GAA	AUUAAUGA	UCAUUAAUU	AUCAAAGA
1203	AUCUUUGA	CUGAUGA	X	GAA	AAUUAAUG	CAUUAAUUA	UCAAAGAU
1205	ACAUCUUU	CUGAUGA	X	GAA	AUAAUUAA	UUAAUUAUC	AAAGAUGU
1237	AGAUCGUA	CUGAUGA	X	GAA	AGUCCCCU	AGGGGACUA	UACGAUCU
1239	CAAGAUCG	CUGAUGA	X	GAA	AUAGUCCC	GGGACUAUA	CGAUCUUG
1244	CCCAGCAA	CUGAUGA	X	GAA	AUCGUAUA	UAUACGAUC	UUGCUGGG
1246	UGCCCAGC	CUGAUGA	X	GAA	AGAUCGUA	UACGAUCUU	GCUGGGCA
1256	GACUGCUU	CUGAUGA	X	GAA	AUGCCCAG	CUGGGCAUA	AAGCAGUC
1264	AUAGCCUU	CUGAUGA	X	GAA	ACUGCUUU	AAAGCAGUC	AAGGCUAU
1271	UUUUUAAA	CUGAUGA	X	GAA	AGCCUUGA	UCAAGGCUA	UUUAAAAA
1273	GGUUUUUA	CUGAUGA	X	GAA	AUAGCCUU	AAGGCUAUU	UAAAAACC
1274	AGGUUUUU	CUGAUGA	X	GAA	AAUAGCCU	AGGCUAUUU	AAAAACCU
1275	GAGGUUUU	CUGAUGA	X	GAA	AAAUAGCC	GGCUAUUUA	AAAACCUC
1283	GUGGCAGU	CUGAUGA	X	GAA	AGGUUUUU	AAAAACCUC	ACUGCCAC
1293	UACAAUGA	CUGAUGA	X	GAA	AGUGGCAG	CUGCCACUC	UCAUUGUA
1295	UUUACAAU	CUGAUGA	X	GAA	AGAGUGGC	GCCACUCUC	AUUGUAAA
1298	ACGUUUAC	CUGAUGA	X	GAA	AUGAGAGU	ACUCUCAUU	GUAAACGU
1301	UUCACGUU	CUGAUGA	X	GAA	ACAAUGAG	CUCAUUGUA	AACGUGAA
1314	GUAGAUCU	CUGAUGA	X	GAA	AGGUUUCA	UGAAACCUC	AGAUCUAC
1319	UUUUCGUA	CUGAUGA	X	GAA	AUCUGAGG	CCUCAGAUC	UACGAAAA
1321	ACUUUUCG	CUGAUGA	X	GAA	AGAUCUGA	UCAGAUCUA	CGAAAAGU
1330	AGGACACG	CUGAUGA	X	GAA	ACUUUUCG	CGAAAAGUC	CGUGUCCU
1336	GAAGCGAG	CUGAUGA	X	GAA	ACACGGAC	GUCCGUGUC	CUCGCUUC
1339	UUGGAAGC	CUGAUGA	X	GAA	AGGACACG	CGUGUCCUC	GCUUCCAA
1343	GGGCUUGG	CUGAUGA	X	GAA	AGCGAGGA	UCCUCGCUU	CCAAGCCC
1344	UGGGCUUG	CUGAUGA	X	GAA	AAGCGAGG	CCUCGCUUC	CAAGCCCA
1356	CGGAUAGA	CUGAUGA	X	GAA	AGGUGGGC	GCCCACCUC	UCUAUCCG

1358	AGCGGAUA CUGAUGA X GAA AGAGGUGG	CCACCUCUC UAUCCGCU
1360	CCAGCGGA CUGAUGA X GAA AGAGAGGU	ACCUCUCUA UCCGCUGG
1362	GCCCAGCG CUGAUGA X GAA AUAGAGAG	CUCUCUAUC CGCUGGGC
1382	CAAGUGAG CUGAUGA X GAA ACUUGUCU	AGACAAGUC CUCACUUG
1385	GUGCAAGU CUGAUGA X GAA AGGACUUG	CAAGUCCUC ACUUGCAC
1389	CACGGUGC CUGAUGA X GAA AGUGAGGA	UCCUCACUU GCACCGUG
1399	GGAUGCCA CUGAUGA X GAA ACACGGUG	CACCGUGUA UGGCAUCC
1406	GGCCGAGG CUGAUGA X GAA AUGCCAUA	UAUGGCAUC CCUCGGCC
1410	UGUUGGCC CUGAUGA X GAA AGGGAUGC	GCAUCCCUC GGCCAACA
1421	AGCCACGU CUGAUGA X GAA AUUGUUGG	CCAACAAUC ACGUGGCU
1430	GGGUGCCA CUGAUGA X GAA AGCCACGU	ACGUGGCUC UGGCACCC
1443	AUUGUGGU CUGAUGA X GAA ACAGGGGU	ACCCCUGUC ACCACAAU
1452	UUUGGAGU CUGAUGA X GAA AUUGUGGU	ACCACAAUC ACUCCAAA
1456	UUUCUUUG CUGAUGA X GAA AGUGAUUG	CAAUCACUC CAAAGAAA
1468	AGAAGUCA CUGAUGA X GAA ACCUUUCU	AGAAAGGUA UGACUUCU
1474	CAGUGCAG CUGAUGA X GAA AGUCAUAC	GUAUGACUU CUGCACUG
1475	UCAGUGCA CUGAUGA X GAA AAGUCAUA	UAUGACUUC UGCACUGA
1495	GGAUAAAG CUGAUGA X GAA AUUCUUCA	UGAAGAAUC CUUUAUCC
1498	CCAGGAUA CUGAUGA X GAA AGGAUUCU	AGAAUCCUU UAUCCUGG
1499	UCCAGGAU CUGAUGA X GAA AAGGAUUC	GAAUCCUUU AUCCUGGA
1500	AUCCAGGA CUGAUGA X GAA AAAGGAUU	AAUCCUUUA UCCUGGAU
1502	GGAUCCAG CUGAUGA X GAA AUAAAGGA	UCCUUUAUC CUGGAUCC
1509	GCUGCUGG CUGAUGA X GAA AUCCAGGA	UCCUGGAUC CCAGCAGC
1522	UGUUUCCU CUGAUGA X GAA AGUUGCUG	CAGCAACUU AGGAAACA
1523	CUGUUUCC CUGAUGA X GAA AAGUUGCU	AGCAACUUA GGAAACAG
1535	AUGCUCUC CUGAUGA X GAA AUUCUGUU	AACAGAAUU GAGAGCAU
1544	CGCUGAGA CUGAUGA X GAA AUGCUCUC	GAGAGCAUC UCUCAGCG
1546	UGCGCUGA CUGAUGA X GAA AGAUGCUC	GAGCAUCUC UCAGCGCA
1548	CAUGCGCU CUGAUGA X GAA AGAGAUGC	GCAUCUCUC AGCGCAUG
1562	CCUUCUAU CUGAUGA X GAA ACCGUCAU	AUGACGGUC AUAGAAGG
1565	GUUCCUUC CUGAUGA X GAA AUGACCGU	ACGGUCAUA GAAGGAAC
1578	AACCGUCU CUGAUGA X GAA AUUUGUUC	GAACAAAUA AGACGGUU
1586	AAUGUGCU CUGAUGA X GAA ACCGUCUU	AAGACGGUU AGCACAUU

1587	CAAUGUGC CUGAUGA X GAA AACCGUCU	AGACGGUUA GCACAUUG
1594	CCACCACC CUGAUGA X GAA AUGUGCUA	UAGCACAUU GGUGGUGG
1609	GGGUCUGA CUGAUGA X GAA AGUCAGCC	GGCUGACUC UCAGACCC
1611	AGGGGUCU CUGAUGA X GAA AGAGUCAG	CUGACUCUC AGACCCCU
1625	CAGCUGUA CUGAUGA X GAA AUUCCAGG	CCUGGAAUC UACAGCUG
1627	GGCAGCUG CUGAUGA X GAA AGAUUCCA	UGGAAUCUA CAGCUGCC
1642	UUUUAUUG CUGAUGA X GAA AGGCCCGG	CCGGGCCUU CAAUAAAA
1643	AUUUUAUU CUGAUGA X GAA AAGGCCCG	CGGGCCUUC AAUAAAAU
1647	CCCUAUUU CUGAUGA X GAA AUUGAAGG	CCUUCAAUA AAAUAGGG
1652	ACAGUCCC CUGAUGA X GAA AUUUUAUU	AAUAAAAUA GGGACUGU
1673	UAAAAUUU CUGAUGA X GAA AUGUUUCU	AGAAACAUA AAAUUUUA
1678	UGACAUAA CUGAUGA X GAA AUUUUAUG	CAUAAAAUU UUAUGUCA
1679	GUGACAUA CUGAUGA X GAA AAUUUUAU	AUAAAAUUU UAUGUCAC
1680	UGUGACAU CUGAUGA X GAA AAAUUUUA	UAAAAUUUU AUGUCACA
1681	CUGUGACA CUGAUGA X GAA AAAAUUUU	AAAAUUUUA UGUCACAG
1685	ACAUCUGU CUGAUGA X GAA ACAUAAAA	UUUUAUGUC ACAGAUGU
1705	AAACGUGA CUGAUGA X GAA AGCCAUUC	GAAUGGCUU UCACGUUU
1706	GAAACGUG CUGAUGA X GAA AAGCCAUU	AAUGGCUUU CACGUUUC
1707	GGAAACGU CUGAUGA X GAA AAAGCCAU	AUGGCUUUC ACGUUUCC
1712	UCCAAGGA CUGAUGA X GAA ACGUGAAA	UUUCACGUU UCCUUGGA
1713	UUCCAAGG CUGAUGA X GAA AACGUGAA	UUCACGUUU CCUUGGAA
1714	UUUCCAAG CUGAUGA X GAA AAACGUGA	UCACGUUUC CUUGGAAA
1717	UCUUUUCC CUGAUGA X GAA AGGAAACG	CGUUUCCUU GGAAAAGA
1756	CCACACAG CUGAUGA X GAA ACAGUUUC	GAAACUGUC CUGUGUGG
1766	AAUUUAUU CUGAUGA X GAA ACCACACA	UGUGUGGUC AAUAAAUU
1770	CAGGAAUU CUGAUGA X GAA AUUGACCA	UGGUCAAUA AAUUCCUG
1774	UGUACAGG CUGAUGA X GAA AUUUAUUG	CAAUAAAUU CCUGUACA
1775	CUGUACAG CUGAUGA X GAA AAUUUAUU	AAUAAAUUC CUGUACAG
1780	UGUCUCUG CUGAUGA X GAA ACAGGAAU	AUUCCUGUA CAGAGACA
1790	AUCCAGGU CUGAUGA X GAA AUGUCUCU	AGAGACAUU ACCUGGAU
1791	AAUCCAGG CUGAUGA X GAA AAUGUCUC	GAGACAUUA CCUGGAUU
1799	CGUAGCAG CUGAUGA X GAA AUCCAGGU	ACCUGGAUU CUGCUACG
1800	CCGUAGCA CUGAUGA X GAA AAUCCAGG	CCUGGAUUC UGCUACGG

1805	ACUGUCCG CUGAUGA X GAA AGCAGAAU	AUUCUGCUA CGGACAGU
1814	CUGUUGUU CUGAUGA X GAA ACUGUCCG	CGGACAGUU AACAACAG
1815	UCUGUUGU CUGAUGA X GAA AACUGUCC	GGACAGUUA ACAACAGA
1836	GCUGAUAC CUGAUGA X GAA AUGGUGCA	UGCACCAUA GUAUCAGC
1839	CUUGCUGA CUGAUGA X GAA ACUAUGGU	ACCAUAGUA UCAGCAAG
1841	UGCUUGCU CUGAUGA X GAA AUACUAUG	CAUAGUAUC AGCAAGCA
1866	GUAAUCUU CUGAUGA X GAA AGUGGUGG	CCACCACUC AAGAUUAC
1872	GAUGGAGU CUGAUGA X GAA AUCUUGAG	CUCAAGAUU ACUCCAUC
1873	UGAUGGAG CUGAUGA X GAA AAUCUUGA	UCAAGAUUA CUCCAUCA
1876	GAGUGAUG CUGAUGA X GAA AGUAAUCU	AGAUUACUC CAUCACUC
1880	UUCAGAGU CUGAUGA X GAA AUGGAGUA	UACUCCAUC ACUCUGAA
1884	AAGGUUCA CUGAUGA X GAA AGUGAUGG	CCAUCACUC UGAACCUU
1892	UUGAUGAC CUGAUGA X GAA AGGUUCAG	CUGAACCUU GUCAUCAA
1895	UUCUUGAU CUGAUGA X GAA ACAAGGUU	AACCUUGUC AUCAAGAA
1898	ACGUUCUU CUGAUGA X GAA AUGACAAG	CUUGUCAUC AAGAACGU
1909	CUUCUAGA CUGAUGA X GAA ACACGUUC	GAACGUGUC UCUAGAAG
1911	GUCUUCUA CUGAUGA X GAA AGACACGU	ACGUGUCUC UAGAAGAC
1913	GAGUCUUC CUGAUGA X GAA AGAGACAC	GUGUCUCUA GAAGACUC
1921	AGGUGCCC CUGAUGA X GAA AGUCUUCU	AGAAGACUC GGGCACCU
1930	UGCACGCA CUGAUGA X GAA AGGUGCCC	GGGCACCUA UGCGUGCA
1952	CCUGUGUA CUGAUGA X GAA AUGUUCCU	AGGAACAUA UACACAGG
1954	CCCCUGUG CUGAUGA X GAA AUAUGUUC	GAACAUAUA CACAGGGG
1970	UUCCGAAG CUGAUGA X GAA AUGUCUUC	GAAGACAUC CUUCGGAA
1973	GUCUUCCG CUGAUGA X GAA AGGAUGUC	GACAUCCUU CGGAAGAC
1974	UGUCUUCC CUGAUGA X GAA AAGGAUGU	ACAUCCUUC GGAAGACA
1988	CUAACGAG CUGAUGA X GAA ACUUCUGU	ACAGAAGUU CUCGUUAG
1989	UCUAACGA CUGAUGA X GAA AACUUCUG	CAGAAGUUC UCGUUAGA
1991	UCUCUAAC CUGAUGA X GAA AGAACUUC	GAAGUUCUC GUUAGAGA
1994	GAAUCUCU CUGAUGA X GAA ACGAGAAC	GUUCUCGUU AGAGAUUC
1995	CGAAUCUC CUGAUGA X GAA AACGAGAA	UUCUCGUUA GAGAUUCG
2001	CGCUUCCG CUGAUGA X GAA AUCUCUAA	UUAGAGAUU CGGAAGCG
2002	GCGCUUCC CUGAUGA X GAA AAUCUCUA	UAGAGAUUC GGAAGCGC
2021	AGGUUUUG CUGAUGA X GAA AGCAGGUG	CACCUGCUU CAAAACCU

2022	GAGGUUUU CUGAUGA X GAA AAGCAGGU	ACCUGCUUC AAAACCUC
2030	UAGUCACU CUGAUGA X GAA AGGUUUUG	CAAAACCUC AGUGACUA
2038	AGACCUCG CUGAUGA X GAA AGUCACUG	CAGUGACUA CGAGGUCU
2045	CUGAUGGA CUGAUGA X GAA ACCUCGUA	UACGAGGUC UCCAUCAG
2047	CACUGAUG CUGAUGA X GAA AGACCUCG	CGAGGUCUC CAUCAGUG
2051	GAGCCACU CUGAUGA X GAA AUGGAGAC	GUCUCCAUC AGUGGCUC
2059	AGGUCGUA CUGAUGA X GAA AGCCACUG	CAGUGGCUC UACGACCU
2061	UAAGGUCG CUGAUGA X GAA AGAGCCAC	GUGGCUCUA CGACCUUA
2068	GACAGUCU CUGAUGA X GAA AGGUCGUA	UACGACCUU AGACUGUC
2069	UGACAGUC CUGAUGA X GAA AAGGUCGU	ACGACCUUA GACUGUCA
2076	UCUAGCUU CUGAUGA X GAA ACAGUCUA	UAGACUGUC AAGCUAGA
2082	GACACCUC CUGAUGA X GAA AGCUUGAC	GUCAAGCUA GAGGUGUC
2090	GGCGCGGG CUGAUGA X GAA ACACCUCU	AGAGGUGUC CCCGCGCC
2100	AGUGAUCU CUGAUGA X GAA AGGCGCGG	CCGCGCCUC AGAUCACU
2105	AACCAAGU CUGAUGA X GAA AUCUGAGG	CCUCAGAUC ACUUGGUU
2109	UUUGAACC CUGAUGA X GAA AGUGAUCU	AGAUCACUU GGUUCAAA
2113	UGUUUUUG CUGAUGA X GAA ACCAAGUG	CACUUGGUU CAAAAACA
2114	UUGUUUUU CUGAUGA X GAA AACCAAGU	ACUUGGUUC AAAAACAA
2132	UCUUGUUG CUGAUGA X GAA AUUUUGUG	CACAAAAUA CAACAAGA
2150	CCUAAAAU CUGAUGA X GAA AUUCCCGG	CCGGGAAUU AUUUUAGG
2151	UCCUAAAA CUGAUGA X GAA AAUUCCCG	CGGGAAUUA UUUUAGGA
2153	GGUCCUAA CUGAUGA X GAA AUAAUUCC	GGAAUUAUU UUAGGACC
2154	UGGUCCUA CUGAUGA X GAA AAUAAUUC	GAAUUAUUU UAGGACCA
2155	CUGGUCCU CUGAUGA X GAA AAAUAAUU	AAUUAUUUU AGGACCAG
2156	CCUGGUCC CUGAUGA X GAA AAAAUAAU	AUUAUUUUA GGACCAGG
2179	UUUCAAUA CUGAUGA X GAA ACAGCGUG	CACGCUGUU UAUUGAAA
2180	CUUUCAAU CUGAUGA X GAA AACAGCGU	ACGCUGUUU AUUGAAAG
2181	UCUUUCAA CUGAUGA X GAA AAACAGCG	CGCUGUUUA UUGAAAGA
2183	ACUCUUUC CUGAUGA X GAA AUAAACAG	CUGUUUAUU GAAAGAGU
2192	UCCUCUGU CUGAUGA X GAA ACUCUUUC	GAAAGAGUC ACAGAGGA
2213	CACCUAUA CUGAUGA X GAA ACACCCUC	GAGGGUGUC UAUAGGUG
2215	GGCACCUA CUGAUGA X GAA AGACACCC	GGGUGUCUA UAGGUGCC
2217	UCGGCACC CUGAUGA X GAA AUAGACAC	GUGUCUAUA GGUGCCGA

2263	CGGUGAGG	CUGAUGA	X	GAA	AGGCUGCG	CGCAGCCUA	CCUCACCG
2267	UGCACGGU	CUGAUGA	X	GAA	AGGUAGGC	GCCUACCUC	ACCGUGCA
2284	ACUUGUCU	CUGAUGA	X	GAA	AGGUUCCU	AGGAACCUC	AGACAAGU
2293	CCAGGUUU	CUGAUGA	X	GAA	ACUUGUCU	AGACAAGUC	AAACCUGG
2309	GUGAGCGU	CUGAUGA	X	GAA	AUCAGCUC	GAGCUGAUC	ACGCUCAC
2315	GUGCACGU	CUGAUGA	X	GAA	AGCGUGAU	AUCACGCUC	ACGUGCAC
2342	AGCCAAAA	CUGAUGA	X	GAA	AGGGUCGC	GCGACCCUC	UUUUGGCU
2344	GGAGCCAA	CUGAUGA	X	GAA	AGAGGGUC	GACCCUCUU	UUGGCUCC
2345	AGGAGCCA	CUGAUGA	X	GAA	AAGAGGGU	ACCCUCUUU	UGGCUCCU
2346	AAGGAGCC	CUGAUGA	X	GAA	AAAGAGGG	CCCUCUUUU	GGCUCCUU
2351	GUUAGAAG	CUGAUGA	X	GAA	AGCCAAAA	UUUUGGCUC	CUUCUAAC
2354	AGAGUUAG	CUGAUGA	X	GAA	AGGAGCCA	UGGCUCCUU	CUAACUCU
2355	GAGAGUUA	CUGAUGA	X	GAA	AAGGAGCC	GGCUCCUUC	UAACUCUC
2357	AAGAGAGU	CUGAUGA	X	GAA	AGAAGGAG	CUCCUUCUA	ACUCUCUU
2361	GAUGAAGA	CUGAUGA	X	GAA	AGUUAGAA	UUCUAACUC	UCUUCAUC
2363	CUGAUGAA	CUGAUGA	X	GAA	AGAGUUAG	CUAACUCUC	UUCAUCAG
2365	UUCUGAUG	CUGAUGA	X	GAA	AGAGAGUU	AACUCUCUU	CAUCAGAA
2366	UUUCUGAU	CUGAUGA	X	GAA	AAGAGAGU	ACUCUCUUC	AUCAGAAA
2369	AGUUUUCU	CUGAUGA	X	GAA	AUGAAGAG	CUCUUCAUC	AGAAAACU
2386	CGGAAGAA	CUGAUGA	X	GAA	ACCGCUUC	GAAGCGGUC	UUCUUCCG
2388	UUCGGAAG	CUGAUGA	X	GAA	AGACCGCU	AGCGGUCUU	CUUCCGAA
2389	CUUCGGAA	CUGAUGA	X	GAA	AAGACCGC	GCGGUCUUC	UUCCGAAG
2391	UACUUCGG	CUGAUGA	X	GAA	AGAAGACC	GGUCUUCUU	CCGAAGUA
2392	UUACUUCG	CUGAUGA	X	GAA	AAGAAGAC	GUCUUCUUC	CGAAGUAA
2399	UCUGUCUU	CUGAUGA	X	GAA	ACUUCGGA	UCCGAAGUA	AAGACAGA
2410	UUGACAGG	CUGAUGA	X	GAA	AGUCUGUC	GACAGACUA	CCUGUCAA
2416	UAAUGAUU	CUGAUGA	X	GAA	ACAGGUAG	CUACCUGUC	AAUCAUUA
2420	UCCAUAAU	CUGAUGA	X	GAA	AUUGACAG	CUGUCAAUC	AUUAUGGA
2423	GGGUCCAU	CUGAUGA	X	GAA	AUGAUUGA	UCAAUCAUU	AUGGACCC
2424	UGGGUCCA	CUGAUGA	X	GAA	AAUGAUUG	CAAUCAUUA	UGGACCCA
2441	UCCAGGGG	CUGAUGA	X	GAA	ACUUCAUC	GAUGAAGUU	CCCCUGGA
2442	AUCCAGGG	CUGAUGA	X	GAA	AACUUCAU	AUGAAGUUC	CCCUGGAU
2473	UGGCAUCA	CUGAUGA	X	GAA	AGGGCAGC	GCUGCCCUA	UGAUGCCA

2494	CCCGUGCA CUGAUGA X GAA ACUCCCAC	GUGGGAGUU UGCACGGG
2495	UCCCGUGC CUGAUGA X GAA AACUCCCA	UGGGAGUUU GCACGGGA
2516	GAUUUGCC CUGAUGA X GAA AGUUUCAG	CUGAAACUA GGCAAAUC
2524	UUCCGAGC CUGAUGA X GAA AUUUGCCU	AGGCAAAUC GCUCGGAA
2528	CCUCUUCC CUGAUGA X GAA AGCGAUUU	AAAUCGCUC GGAAGAGG
2541	UUUCCCAA CUGAUGA X GAA AGCCCCUC	GAGGGGCUU UUGGGAAA
2542	CUUUCCCA CUGAUGA X GAA AAGCCCCU	AGGGGCUUU UGGGAAAG
2543	ACUUUCCC CUGAUGA X GAA AAAGCCCC	GGGGCUUUU GGGAAAGU
2552	GCUUGAAC CUGAUGA X GAA ACUUUCCC	GGGAAAGUC GUUCAAGC
2555	GAGGCUUG CUGAUGA X GAA ACGACUUU	AAAGUCGUU CAAGCCUC
2556	AGAGGCUU CUGAUGA X GAA AACGACUU	AAGUCGUUC AAGCCUCU
2563	CAAAUGCA CUGAUGA X GAA AGGCUUGA	UCAAGCCUC UGCAUUUG
2569	UAAUGCCA CUGAUGA X GAA AUGCAGAG	CUCUGCAUU UGGCAUUA
2570	UUAAUGCC CUGAUGA X GAA AAUGCAGA	UCUGCAUUU GGCAUUAA
2576	GAUUUCUU CUGAUGA X GAA AUGCCAAA	UUUGGCAUU AAGAAAUC
2577	UGAUUUCU CUGAUGA X GAA AAUGCCAA	UUGGCAUUA AGAAAUCA
2584	AGGUGGGU CUGAUGA X GAA AUUUCUUA	UAAGAAAUC ACCCACCU
2617	CCUCUUUC CUGAUGA X GAA ACAUCUUC	GAAGAUGUU GAAAGAGG
2644	GAGCUUUG CUGAUGA X GAA ACUCACUG	CAGUGAGUA CAAAGCUC
2652	GGUCAUCA CUGAUGA X GAA AGCUUUGU	ACAAAGCUC UGAUGACC
2666	AAGAUCUU CUGAUGA X GAA AGUUCGGU	ACCGAACUC AAGAUCUU
2672	UGGGUCAA CUGAUGA X GAA AUCUUGAG	CUCAAGAUC UUGACCCA
2674	UGUGGGUC CUGAUGA X GAA AGAUCUUG	CAAGAUCUU GACCCACA
2684	UGAUGGCC CUGAUGA X GAA AUGUGGGU	ACCCACAUC GGCCAUCA
2691	AUUCAGAU CUGAUGA X GAA AUGGCCGA	UCGGCCAUC AUCUGAAU
2694	CACAUUCA CUGAUGA X GAA AUGAUGGC	GCCAUCAUC UGAAUGUG
2705	AGGAGGUU CUGAUGA X GAA ACCACAUU	AAUGUGGUU AACCUCCU
2706	CAGGAGGU CUGAUGA X GAA AACCACAU	AUGUGGUUA ACCUCCUG
2711	GCUCCCAG CUGAUGA X GAA AGGUUAAC	GUUAACCUC CUGGGAGC
2742	CACCAUCA CUGAUGA X GAA AGGCCCUC	GAGGGCCUC UGAUGGUG
2753	UAUUCCAC CUGAUGA X GAA AUCACCAU	AUGGUGAUC GUGGAAUA
2761	AUUUGCAG CUGAUGA X GAA AUUCCACG	CGUGGAAUA CUGCAAAU
2770	GGUUUCCG CUGAUGA X GAA AUUUGCAG	CUGCAAAUA CGGAAACC

2782	GGUAGUUG	CUGAUGA	X	GAA	ACAGGUUU	AAACCUGUC	CAACUACC
2788	UCUUGAGG	CUGAUGA	X	GAA	AGUUGGAC	GUCCAACUA	CCUCAAGA
2792	UUGCUCUU	CUGAUGA	X	GAA	AGGUAGUU	AACUACCUC	AAGAGCAA
2809	GACAGAAU	CUGAUGA	X	GAA	AGUCACGU	ACGUGACUU	AUUCUGUC
2810	AGACAGAA	CUGAUGA	X	GAA	AAGUCACG	CGUGACUUA	UUCUGUCU
2812	UGAGACAG	CUGAUGA	X	GAA	AUAAGUCA	UGACUUAUU	CUGUCUCA
2813	UUGAGACA	CUGAUGA	X	GAA	AAUAAGUC	GACUUAUUC	UGUCUCAA
2817	CUUGUUGA	CUGAUGA	X	GAA	ACAGAAUA	UAUUCUGUC	UCAACAAG
2819	UCCUUGUU	CUGAUGA	X	GAA	AGACAGAA	UUCUGUCUC	AACAAGGA
2836	CCAUAUGC	CUGAUGA	X	GAA	AGGCUGCG	CGCAGCCUU	GCAUAUGG
2841	GAGCUCCA	CUGAUGA	X	GAA	AUGCAAGG	CCUUGCAUA	UGGAGCUC
2849	UCUUUCUU	CUGAUGA	X	GAA	AGCUCCAU	AUGGAGCUC	AAGAAAGA
2900	ACACUGUC	CUGAUGA	X	GAA	AGGCGGGG	CCCCGCCUA	GACAGUGU
2909	GAGCUGCU	CUGAUGA	X	GAA	ACACUGUC	GACAGUGUC	AGCAGCUC
2917	UGACACUU	CUGAUGA	X	GAA	AGCUGCUG	CAGCAGCUC	AAGUGUCA
2924	GAGCUGGU	CUGAUGA	X	GAA	ACACUUGA	UCAAGUGUC	ACCAGCUC
2932	GGAAGCUG	CUGAUGA	X	GAA	AGCUGGUG	CACCAGCUC	CAGCUUCC
2938	CUUCAGGG	CUGAUGA	X	GAA	AGCUGGAG	CUCCAGCUU	CCCUGAAG
2939	UCUUCAGG	CUGAUGA	X	GAA	AAGCUGGA	UCCAGCUUC	CCUGAAGA
2982	CUCACUGU	CUGAUGA	X	GAA	AUCCUCGU	ACGAGGAUU	ACAGUGAG
2983	UCUCACUG	CUGAUGA	X	GAA	AAUCCUCG	CGAGGAUUA	CAGUGAGA
2993	UGCUUGGA	CUGAUGA	X	GAA	AUCUCACU	AGUGAGAUC	UCCAAGCA
2995	GCUGCUUG	CUGAUGA	X	GAA	AGAUCUCA	UGAGAUCUC	CAAGCAGC
3008	UCCAUGGU	CUGAUGA	X	GAA	AGGGGCUG	CAGCCCCUC	ACCAUGGA
3026	CUGUAGGA	CUGAUGA	X	GAA	AUCAGGUC	GACCUGAUU	UCCUACAG
3027	ACUGUAGG	CUGAUGA	X	GAA	AAUCAGGU	ACCUGAUUU	CCUACAGU
3028	AACUGUAG	CUGAUGA	X	GAA	AAAUCAGG	CCUGAUUUC	CUACAGUU
3031	GGAAACUG	CUGAUGA	X	GAA	AGGAAAUC	GAUUUCCUA	CAGUUUCC
3036	CACUUGGA	CUGAUGA	X	GAA	ACUGUAGG	CCUACAGUU	UCCAAGUG
3037	CCACUUGG	CUGAUGA	X	GAA	AACUGUAG	CUACAGUUU	CCAAGUGG
3038	GCCACUUG	CUGAUGA	X	GAA	AAACUGUA	UACAGUUUC	CAAGUGGC
3061	AGGACAGA	CUGAUGA	X	GAA	ACUCCAUG	CAUGGAGUU	UCUGUCCU
3062	GAGGACAG	CUGAUGA	X	GAA	AACUCCAU	AUGGAGUUU	CUGUCCUC

3063	GGAGGACA	CUGAUGA	X	GAA	AAACUCCA	UGGAGUUUC UGUCCUCC
3067	UUCUGGAG	CUGAUGA	X	GAA	ACAGAAAC	GUUUCUGUC CUCCAGAA
3070	ACUUUCUG	CUGAUGA	X	GAA	AGGACAGA	UCUGUCCUC CAGAAAGU
3083	UCCCGAUG	CUGAUGA	X	GAA	AUGCACUU	AAGUGCAUU CAUCGGGA
3084	GUCCCGAU	CUGAUGA	X	GAA	AAUGCACU	AGUGCAUUC AUCGGGAC
3087	CAGGUCCC	CUGAUGA	X	GAA	AUGAAUGC	GCAUUCAUC GGGACCUG
3110	GAUAAAAG	CUGAUGA	X	GAA	AUGUUUCU	AGAAACAUC CUUUUAUC
3113	UCAGAUAA	CUGAUGA	X	GAA	AGGAUGUU	AACAUCCUU UUAUCUGA
3114	CUCAGAUA	CUGAUGA	X	GAA	AAGGAUGU	ACAUCCUUU UAUCUGAG
3115	UCUCAGAU	CUGAUGA	X	GAA	AAAGGAUG	CAUCCUUUU AUCUGAGA
3116	UUCUCAGA	CUGAUGA	X	GAA	AAAAGGAU	AUCCUUUUA UCUGAGAA
3118	UGUUCUCA	CUGAUGA	X	GAA	AUAAAAGG	CCUUUUAUC UGAGAACA
3140	AAGUCGCA	CUGAUGA	X	GAA	AUCUUCAC	GUGAAGAUU UGCGACUU
3141	AAAGUCGC	CUGAUGA	X	GAA	AAUCUUCA	UGAAGAUUU GCGACUUU
3148	CCAGGCCA	CUGAUGA	X	GAA	AGUCGCAA	UUGCGACUU UGGCCUGG
3149	GCCAGGCC	CUGAUGA	X	GAA	AAGUCGCA	UGCGACUUU GGCCUGGC
3165	CUUAUAAA	CUGAUGA	X	GAA	AUCCCGGG	CCCGGGAUA UUUAUAAG
3167	UUCUUAUA	CUGAUGA	X	GAA	AUAUCCCG	CGGGAUAUU UAUAAGAA
3168	GUUCUUAU	CUGAUGA	X	GAA	AAUAUCCC	GGGAUAUUU AUAAGAAC
3169	GGUUCUUA	CUGAUGA	X	GAA	AAAUAUCC	GGAUAUUUA UAAGAACC
3171	AGGGUUCU	CUGAUGA	X	GAA	AUAAAUAU	AUAUUUAUA AGAACCCU
3183	CCUCACAU	CUGAUGA	X	GAA	AUCAGGGU	ACCCUGAUU AUGUGAGG
3184	UCCUCACA	CUGAUGA	X	GAA	AAUCAGGG	CCCUGAUUA UGUGAGGA
3201	AAGUCGAG	CUGAUGA	X	GAA	AUCUCCUC	GAGGAGAUA CUCGACUU
3204	GGGAAGUC	CUGAUGA	X	GAA	AGUAUCUC	GAGAUACUC GACUUCCC
3209	UUUAGGGG	CUGAUGA	X	GAA	AGUCGAGU	ACUCGACUU CCCCUAAA
3210	UUUUAGGG	CUGAUGA	X	GAA	AAGUCGAG	CUCGACUUC CCCUAAAA
3215	AUCCAUUU	CUGAUGA	X	GAA	AGGGGAAG	CUUCCCCUA AAAUGGAU
3228	GGAUUCAG	CUGAUGA	X	GAA	AGCCAUCC	GGAUGGCUC CUGAAUCC
3235	CAAAGAUG	CUGAUGA	X	GAA	AUUCAGGA	UCCUGAAUC CAUCUUUG
3239	UUGUCAAA	CUGAUGA	X	GAA	AUGGAUUC	GAAUCCAUC UUUGACAA
3241	CCUUGUCA	CUGAUGA	X	GAA	AGAUGGAU	AUCCAUCUU UGACAAGG
3242	ACCUUGUC	CUGAUGA	X	GAA	AAGAUGGA	UCCAUCUUU GACAAGGU

3251	GUGCUGUA CUGAUGA X GAA ACCUUGUC	GACAAGGUC UACAGCAC
3253	UGGUGCUG CUGAUGA X GAA AGACCUUG	CAAGGUCUA CAGCACCA
3277	CGCCAUAG CUGAUGA X GAA ACCACACA	UGUGUGGUC CUAUGGCG
3280	ACACGCCA CUGAUGA X GAA AGGACCAC	GUGGUCCUA UGGCGUGU
3289	CCCACAGC CUGAUGA X GAA ACACGCCA	UGGCGUGUU GCUGUGGG
3302	AAGGAGAA CUGAUGA X GAA AUCUCCCA	UGGGAGAUC UUCUCCUU
3304	CUAAGGAG CUGAUGA X GAA AGAUCUCC	GGAGAUCUU CUCCUUAG
3305	CCUAAGGA CUGAUGA X GAA AAGAUCUC	GAGAUCUUC UCCUUAGG
3307	CCCCUAAG CUGAUGA X GAA AGAAGAUC	GAUCUUCUC CUUAGGGG
3310	AACCCCCU CUGAUGA X GAA AGGAGAAG	CUUCUCCUU AGGGGGUU
3311	GAACCCCC CUGAUGA X GAA AAGGAGAA	UUCUCCUUA GGGGGUUC
3318	GUAUGGAG CUGAUGA X GAA ACCCCCUA	UAGGGGGUU CUCCAUAC
3319	GGUAUGGA CUGAUGA X GAA AACCCCCU	AGGGGGUUC UCCAUACC
3321	UGGGUAUG CUGAUGA X GAA AGAACCCC	GGGGUUCUC CAUACCCA
3325	CUCCUGGG CUGAUGA X GAA AUGGAGAA	UUCUCCAUA CCCAGGAG
3352	GGCUGCAG CUGAUGA X GAA AGUCUUCA	UGAAGACUU CUGCAGCC
3353	CGGCUGCA CUGAUGA X GAA AAGUCUUC	GAAGACUUC UGCAGCCG
3397	GUGUGGCA CUGAUGA X GAA ACUCCGGG	CCCGGAGUA UGCCACAC
3413	AUUUGGUA CUGAUGA X GAA AUUUCAGG	CCUGAAAUC UACCAAAU
3415	UGAUUUGG CUGAUGA X GAA AGAUUUCA	UGAAAUCUA CCAAAUCA
3422	UCCAACAU CUGAUGA X GAA AUUUGGUA	UACCAAAUC AUGUUGGA
3427	AGCAAUCC CUGAUGA X GAA ACAUGAUU	AAUCAUGUU GGAUUGCU
3432	GUGCCAGC CUGAUGA X GAA AUCCAACA	UGUUGGAUU GCUGGCAC
3466	GUUCAGCA CUGAUGA X GAA ACCGGGGC	GCCCCGGUU UGCUGAAC
3467	AGUUCAGC CUGAUGA X GAA AACCGGGG	CCCCGGUUU GCUGAACU
3476	UUCUCCAC CUGAUGA X GAA AGUUCAGC	GCUGAACUU GUGGAGAA
3488	AGGUCACC CUGAUGA X GAA AGUUUCUC	GAGAAACUU GGUGACCU
3500	UUGGCUUG CUGAUGA X GAA AGCAGGUC	GACCUGCUU CAAGCCAA
3501	GUUGGCUU CUGAUGA X GAA AAGCAGGU	ACCUGCUUC AAGCCAAC
3512	UCCUGUUG CUGAUGA X GAA ACGUUGGC	GCCAACGUC CAACAGGA
3531	GGGGAUGU CUGAUGA X GAA AUCUUUCC	GGAAAGAUU ACAUCCCC
3532	GGGGGAUG CUGAUGA X GAA AAUCUUUC	GAAAGAUUA CAUCCCCC
3536	UUGAGGGG CUGAUGA X GAA AUGUAAUC	GAUUACAUC CCCCUCAA

3542	AUGGCAUU	CUGAUGA X GAA	AGGGGGAU		AUCCCCCUC	AAUGCCAU
3551	CUAGUCAG	CUGAUGA X GAA	AUGGCAUU		AAUGCCAUA	CUGACUAG
3558	ACUGUUUC	CUGAUGA X GAA	AGUCAGUA		UACUGACUA	GAAACAGU
3567	UGUGAAGC	CUGAUGA X GAA	ACUGUUUC		GAAACAGUA	GCUUCACA
3571	AGUAUGUG	CUGAUGA X GAA	AGCUACUG		CAGUAGCUU	CACAUACU
3572	GAGUAUGU	CUGAUGA X GAA	AAGCUACU		AGUAGCUUC	ACAUACUC
3577	GGGUCGAG	CUGAUGA X GAA	AUGUGAAG		CUUCACAUA	CUCGACCC
3580	UGGGGGUC	CUGAUGA X GAA	AGUAUGUG		CACAUACUC	GACCCCCA
3592	CCUCAGAG	CUGAUGA X GAA	AGGUGGGG		CCCCACCUU	CUCUGAGG
3593	UCCUCAGA	CUGAUGA X GAA	AAGGUGGG		CCCACCUUC	UCUGAGGA
3595	GGUCCUCA	CUGAUGA X GAA	AGAAGGUG		CACCUUCUC	UGAGGACC
3605	UCCUUGAA	CUGAUGA X GAA	AGGUCCUC		GAGGACCUU	UUCAAGGA
3606	GUCCUUGA	CUGAUGA X GAA	AAGGUCCU		AGGACCUUU	UCAAGGAC
3607	CGUCCUUG	CUGAUGA X GAA	AAAGGUCC		GGACCUUUU	CAAGGACG
3608	CCGUCCUU	CUGAUGA X GAA	AAAAGGUC		GACCUUUUC	AAGGACGG
3619	GAUCUGCA	CUGAUGA X GAA	AGCCGUCC		GGACGGCUU	UGCAGAUC
3620	GGAUCUGC	CUGAUGA X GAA	AAGCCGUC		GACGGCUUU	GCAGAUCC
3627	AAAAUGUG	CUGAUGA X GAA	AUCUGCAA		UUGCAGAUC	CACAUUUU
3633	GGAAUGAA	CUGAUGA X GAA	AUGUGGAU		AUCCACAUU	UUCAUUCC
3634	CGGAAUGA	CUGAUGA X GAA	AAUGUGGA		UCCACAUUU	UCAUUCCG
3635	CCGGAAUG	CUGAUGA X GAA	AAAUGUGG		CCACAUUUU	CAUUCCGG
3636	UCCGGAAU	CUGAUGA X GAA	AAAAUGUG		CACAUUUUC	AUUCCGGA
3639	GCUUCCGG	CUGAUGA X GAA	AUGAAAAU		AUUUUCAUU	CCGGAAGC
3640	AGCUUCCG	CUGAUGA X GAA	AAUGAAAA		UUUUCAUUC	CGGAAGCU
3649	CAUCAUCA	CUGAUGA X GAA	AGCUUCCG		CGGAAGCUC	UGAUGAUG
3664	CGUUUACA	CUGAUGA X GAA	AUCUCACA		UGUGAGAUA	UGUAAACG
3668	AAAGCGUU	CUGAUGA X GAA	ACAUAUCU		AGAUAUGUA	AACGCUUU
3675	GAAUUUGA	CUGAUGA X GAA	AGCGUUUA		UAAACGCUU	UCAAAUUC
3676	UGAAUUUG	CUGAUGA X GAA	AAGCGUUU		AAACGCUUU	CAAAUUCA
3677	AUGAAUUU	CUGAUGA X GAA	AAAGCGUU		AACGCUUUC	AAAUUCAU
3682	GGCUCAUG	CUGAUGA X GAA	AUUUGAAA		UUUCAAAUU	CAUGAGCC
3683	AGGCUCAU	CUGAUGA X GAA	AAUUUGAA		UUCAAAUUC	AUGAGCCU
3701	AAGGUUUU	CUGAUGA X GAA	AUUCUUUC		GAAAGAAUC	AAAACCUU

3709	GCUCCUCA CUGAUGA X GAA AGGUUUUG	CAAAACCUU UGAGGAGC
3710	AGCUCCUC CUGAUGA X GAA AAGGUUUU	AAAACCUUU GAGGAGCU
3719	UUCGGUGA CUGAUGA X GAA AGCUCCUC	GAGGAGCUU UCACCGAA
3720	GUUCGGUG CUGAUGA X GAA AAGCUCCU	AGGAGCUUU CACCGAAC
3721	AGUUCGGU CUGAUGA X GAA AAAGCUCC	GGAGCUUUC ACCGAACU
3730	UGGAGGUG CUGAUGA X GAA AGUUCGGU	ACCGAACUC CACCUCCA
3736	CAAACAUG CUGAUGA X GAA AGGUGGAG	CUCCACCUC CAUGUUUG
3742	AGUCCUCA CUGAUGA X GAA ACAUGGAG	CUCCAUGUU UGAGGACU
3743	UAGUCCUC CUGAUGA X GAA AACAUGGA	UCCAUGUUU GAGGACUA
3751	CCAGCUGA CUGAUGA X GAA AGUCCUCA	UGAGGACUA UCAGCUGG
3753	GUCCAGCU CUGAUGA X GAA AUAGUCCU	AGGACUAUC AGCUGGAC
3765	CAGAGUGC CUGAUGA X GAA AGUGUCCA	UGGACACUA GCACUCUG
3771	GCCCAGCA CUGAUGA X GAA AGUGCUAG	CUAGCACUC UGCUGGGC
3781	GCAAGGGG CUGAUGA X GAA AGCCCAGC	GCUGGGCUC CCCCUUGC
3787	GCUUCAGC CUGAUGA X GAA AGGGGGAG	CUCCCCCUU GCUGAAGC
3799	UCCAGGUG CUGAUGA X GAA ACCGCUUC	GAAGCGGUU CACCUGGA
3800	GUCCAGGU CUGAUGA X GAA AACCGCUU	AAGCGGUUC ACCUGGAC
3829	UCUUCAUG CUGAUGA X GAA AGGCCUUG	CAAGGCCUC CAUGAAGA
3839	CUCAAGUC CUGAUGA X GAA AUCUUCAU	AUGAAGAUA GACUUGAG
3844	CUAUUCUC CUGAUGA X GAA AGUCUAUC	GAUAGACUU GAGAAUAG
3851	UUACUCGC CUGAUGA X GAA AUUCUCAA	UUGAGAAUA GCGAGUAA
3858	CUUGCUUU CUGAUGA X GAA ACUCGCUA	UAGCGAGUA AAAGCAAG
3878	AGAUCGGA CUGAUGA X GAA AGUCCCGC	GCGGGACUU UCCGAUCU
3879	CAGAUCGG CUGAUGA X GAA AAGUCCCG	CGGGACUUU CCGAUCUG
3880	GCAGAUCG CUGAUGA X GAA AAAGUCCC	GGGACUUUC CGAUCUGC
3885	CCUCGGCA CUGAUGA X GAA AUCGGAAA	UUUCCGAUC UGCCGAGG
3901	AGAAGCAG CUGAUGA X GAA AGCUGGGC	GCCCAGCUU CUGCUUCU
3902	GAGAAGCA CUGAUGA X GAA AAGCUGGG	CCCAGCUUC UGCUUCUC
3907	AGCUGGAG CUGAUGA X GAA AGCAGAAG	CUUCUGCUU CUCCAGCU
3908	CAGCUGGA CUGAUGA X GAA AAGCAGAA	UUCUGCUUC UCCAGCUG
3910	CACAGCUG CUGAUGA X GAA AGAAGCAG	CUGCUUCUC CAGCUGUG
3926	ACGGGCCU CUGAUGA X GAA AUGUGGCC	GGCCACAUC AGGCCCGU
3949	CCAGCUCA CUGAUGA X GAA AUUCAUCG	CGAUGAAUC UGAGCUGG

3967	AACAGCAG	CUGAUGA	X	GAA	ACUCCUUU	AAAGGAGUC	CUGCUGUU
3975	GGGUGGAG	CUGAUGA	X	GAA	ACAGCAGG	CCUGCUGUU	CUCCACCC
3976	GGGGUGGA	CUGAUGA	X	GAA	AACAGCAG	CUGCUGUUC	UCCACCCC
3978	UGGGGGUG	CUGAUGA	X	GAA	AGAACAGC	GCUGUUCUC	CACCCCCA
3991	CGGAGUUG	CUGAUGA	X	GAA	AGUCUGGG	CCCAGACUA	CAACUCCG
3997	ACACCACG	CUGAUGA	X	GAA	AGUUGUAG	CUACAACUC	CGUGGUGU
4006	AGGAGUAC	CUGAUGA	X	GAA	ACACCACG	CGUGGUGUU	GUACUCCU
4009	GGGAGGAG	CUGAUGA	X	GAA	ACAACACC	GGUGUUGUA	CUCCUCCC
4012	GCGGGGAG	CUGAUGA	X	GAA	AGUACAAC	GUUGUACUC	CUCCCCGC
4015	CGGGCGGG	CUGAUGA	X	GAA	AGGAGUAC	GUACUCCUC	CCCGCCCG
4027	AGAAGCUU	CUGAUGA	X	GAA	AGGCGGGC	GCCCGCCUA	AAGCUUCU
4033	CUGGUGAG	CUGAUGA	X	GAA	AGCUUUAG	CUAAAGCUU	CUCACCAG
4034	GCUGGUGA	CUGAUGA	X	GAA	AAGCUUUA	UAAAGCUUC	UCACCAGC
4036	GGGCUGGU	CUGAUGA	X	GAA	AGAAGCUU	AAGCUUCUC	ACCAGCCC
4066	AUGUAUAA	CUGAUGA	X	GAA	ACUGUCAG	CUGACAGUA	UUAUACAU
4068	AGAUGUAU	CUGAUGA	X	GAA	AUACUGUC	GACAGUAUU	AUACAUCU
4069	UAGAUGUA	CUGAUGA	X	GAA	AAUACUGU	ACAGUAUUA	UACAUCUA
4071	CAUAGAUG	CUGAUGA	X	GAA	AUAAUACU	AGUAUUAUA	CAUCUAUG
4075	AACUCAUA	CUGAUGA	X	GAA	AUGUAUAA	UUAUACAUC	UAUGAGUU
4077	UAAACUCA	CUGAUGA	X	GAA	AGAUGUAU	AUACAUCUA	UGAGUUUA
4083	UAGGUGUA	CUGAUGA	X	GAA	ACUCAUAG	CUAUGAGUU	UACACCUA
4084	AUAGGUGU	CUGAUGA	X	GAA	AACUCAUA	UAUGAGUUU	ACACCUAU
4085	AAUAGGUG	CUGAUGA	X	GAA	AAACUCAU	AUGAGUUUA	CACCUAUU
4091	GAGCGGAA	CUGAUGA	X	GAA	AGGUGUAA	UUACACCUA	UUCCGCUC
4093	UGGAGCGG	CUGAUGA	X	GAA	AUAGGUGU	ACACCUAUU	CCGCUCCA
4094	GUGGAGCG	CUGAUGA	X	GAA	AAUAGGUG	CACCUAUUC	CGCUCCAC
4099	CUCCUGUG	CUGAUGA	X	GAA	AGCGGAAU	AUUCCGCUC	CACAGGAG
4117	GUCACGAA	CUGAUGA	X	GAA	AGCAGCUG	CAGCUGCUU	UUCGUGAC
4118	GGUCACGA	CUGAUGA	X	GAA	AAGCAGCU	AGCUGCUUU	UCGUGACC
4119	AGGUCACG	CUGAUGA	X	GAA	AAAGCAGC	GCUGCUUUU	CGUGACCU
4120	AAGGUCAC	CUGAUGA	X	GAA	AAAAGCAG	CUGCUUUUC	GUGACCUU
4128	CACGAUUA	CUGAUGA	X	GAA	AGGUCACG	CGUGACCUU	UAAUCGUG
4129	GCACGAUU	CUGAUGA	X	GAA	AAGGUCAC	GUGACCUUU	AAUCGUGC

4130	AGCACGAU	CUGAUGA	X	GAA	AAAGGUCA	UGACCUUUA	AUCGUGCU
4133	AAAAGCAC	CUGAUGA	X	GAA	AUUAAAGG	CCUUUAAUC	GUGCUUUU
4139	AAACAAAA	CUGAUGA	X	GAA	AGCACGAU	AUCGUGCUU	UUUUGUUU
4140	AAAACAAA	CUGAUGA	X	GAA	AAGCACGA	UCGUGCUUU	UUUGUUUU
4141	AAAAACAA	CUGAUGA	X	GAA	AAAGCACG	CGUGCUUUU	UUGUUUUU
4142	AAAAAACA	CUGAUGA	X	GAA	AAAAGCAC	GUGCUUUUU	UGUUUUUU
4143	CAAAAAAC	CUGAUGA	X	GAA	AAAAAGCA	UGCUUUUUU	GUUUUUUG
4146	AAACAAAA	CUGAUGA	X	GAA	ACAAAAAA	UUUUUUGUU	UUUUGUUU
4147	AAAACAAA	CUGAUGA	X	GAA	AACAAAAA	UUUUUGUUU	UUUGUUUU
4148	CAAAACAA	CUGAUGA	X	GAA	AAACAAAA	UUUUGUUUU	UUGUUUUG
4149	ACAAAACA	CUGAUGA	X	GAA	AAAACAAA	UUUGUUUUU	UGUUUUGU
4150	AACAAAAC	CUGAUGA	X	GAA	AAAAACAA	UUGUUUUUU	GUUUUGUU
4153	ACAAACAA	CUGAUGA	X	GAA	ACAAAAAA	UUUUUUGUU	UUGUUUGU
4154	AACAAACA	CUGAUGA	X	GAA	AACAAAAA	UUUUUGUUU	UGUUUGUU
4155	CAACAAAC	CUGAUGA	X	GAA	AAACAAAA	UUUUGUUUU	GUUUGUUG
4158	CAACAACA	CUGAUGA	X	GAA	ACAAAACA	UGUUUUGUU	UGUUGUUG
4159	GCAACAAC	CUGAUGA	X	GAA	AACAAAAC	GUUUUGUUU	GUUGUUGC
4162	ACAGCAAC	CUGAUGA	X	GAA	ACAAACAA	UUGUUUGUU	GUUGCUGU
4165	AAAACAGC	CUGAUGA	X	GAA	ACAACAAA	UUUGUUGUU	GCUGUUUU
4171	UUAGUCAA	CUGAUGA	X	GAA	ACAGCAAC	GUUGCUGUU	UUGACUAA
4172	GUUAGUCA	CUGAUGA	X	GAA	AACAGCAA	UUGCUGUUU	UGACUAAC
4173	UGUUAGUC	CUGAUGA	X	GAA	AAACAGCA	UGCUGUUUU	GACUAACA
4178	AUUCUUGU	CUGAUGA	X	GAA	AGUCAAAA	UUUUGACUA	ACAAGAAU
4189	ACUGGGGU	CUGAUGA	X	GAA	ACAUUCUU	AAGAAUGUA	ACCCCAGU
4198	ACGUCACU	CUGAUGA	X	GAA	ACUGGGGU	ACCCCAGUU	AGUGACGU
4199	CACGUCAC	CUGAUGA	X	GAA	AACUGGGG	CCCCAGUUA	GUGACGUG
4216	AACAAUAG	CUGAUGA	X	GAA	AUUCUUCA	UGAAGAAUA	CUAUUGUU
4219	UCUAACAA	CUGAUGA	X	GAA	AGUAUUCU	AGAAUACUA	UUGUUAGA
4221	UCUCUAAC	CUGAUGA	X	GAA	AUAGUAUU	AAUACUAUU	GUUAGAGA
4224	AUUUCUCU	CUGAUGA	X	GAA	ACAAUAGU	ACUAUUGUU	AGAGAAAU
4225	GAUUUCUC	CUGAUGA	X	GAA	AACAAUAG	CUAUUGUUA	GAGAAAUC
4233	GCGGGGGG	CUGAUGA	X	GAA	AUUUCUCU	AGAGAAAUC	CCCCCCGC
4249	GUUACCCU	CUGAUGA	X	GAA	AGGCUUUG	CAAAGCCUC	AGGGUAAC

4255	GUCCAGGU CUGAUGA X GAA ACCCUGAG	CUCAGGGUA ACCUGGAC
4282	GGUCGCCA CUGAUGA X GAA AGGCACCU	AGGUGCCUC UGGCGACC
4323	GCUGCAGG CUGAUGA X GAA AGGGUGGG	CCCACCCUC CCUGCAGC
4341	ACUGCCUC CUGAUGA X GAA AGUCCCAC	GUGGGACUA GAGGCAGU
4350	AAUGGGCU CUGAUGA X GAA ACUGCCUC	GAGGCAGUA AGCCCAUU
4358	CAUGAGCU CUGAUGA X GAA AUGGGCUU	AAGCCCAUU AGCUCAUG
4359	CCAUGAGC CUGAUGA X GAA AAUGGGCU	AGCCCAUUA GCUCAUGG
4363	GCAGCCAU CUGAUGA X GAA AGCUAAUG	CAUUAGCUC AUGGCUGC
4387	GAGAGACA CUGAUGA X GAA AGCAGGUC	GACCUGCUC UGUCUCUC
4391	AUAAGAGA CUGAUGA X GAA ACAGAGCA	UGCUCUGUC UCUCUUAU
4393	CCAUAAGA CUGAUGA X GAA AGACAGAG	CUCUGUCUC UCUUAUGG
4395	CUCCAUAA CUGAUGA X GAA AGAGACAG	CUGUCUCUC UUAUGGAG
4397	UCCUCCAU CUGAUGA X GAA AGAGAGAC	GUCUCUCUU AUGGAGGA
4398	UUCCUCCA CUGAUGA X GAA AAGAGAGA	UCUCUCUUA UGGAGGAA
4445	GCAUCCCA CUGAUGA X GAA AGCCUUUU	AAAAGGCUU UGGGAUGC
4446	CGCAUCCC CUGAUGA X GAA AAGCCUUU	AAAGGCUUU GGGAUGCG
4456	ACAGGACG CUGAUGA X GAA ACGCAUCC	GGAUGCGUC CGUCCUGU
4460	CUCCACAG CUGAUGA X GAA ACGGACGC	GCGUCCGUC CUGUGGAG
4487	GCAUAGCG CUGAUGA X GAA AGCCCCCU	AGGGGGCUC CGCUAUGC
4492	AAGUGGCA CUGAUGA X GAA AGCGGAGC	GCUCCGCUA UGCCACUU
4500	AGUCACUG CUGAUGA X GAA AGUGGCAU	AUGCCACUU CAGUGACU
4501	AAGUCACU CUGAUGA X GAA AAGUGGCA	UGCCACUUC AGUGACUU
4509	GGAGUGAG CUGAUGA X GAA AGUCACUG	CAGUGACUU CUCACUCC
4510	AGGAGUGA CUGAUGA X GAA AAGUCACU	AGUGACUUC UCACUCCU
4512	CCAGGAGU CUGAUGA X GAA AGAAGUCA	UGACUUCUC ACUCCUGG
4516	GAGGCCAG CUGAUGA X GAA AGUGAGAA	UUCUCACUC CUGGCCUC
4524	AAACAGCG CUGAUGA X GAA AGGCCAGG	CCUGGCCUC CGCUGUUU
4531	GGGCCCGA CUGAUGA X GAA ACAGCGGA	UCCGCUGUU UCGGGCCC
4532	GGGGCCCG CUGAUGA X GAA AACAGCGG	CCGCUGUUU CGGGCCCC
4533	GGGGGCCC CUGAUGA X GAA AAACAGCG	CGCUGUUUC GGGCCCCC
4543	CCUCUUGG CUGAUGA X GAA AGGGGGCC	GGCCCCCUU CCAAGAGG
4544	ACCUCUUG CUGAUGA X GAA AAGGGGGC	GCCCCCUUC CAAGAGGU
4553	UGCUCUGA CUGAUGA X GAA ACCUCUUG	CAAGAGGUA UCAGAGCA

4555	UCUGCUCU	CUGAUGA	X	GAA	AUACCUCU	AGAGGUAUC	AGAGCAGA
4577	GUCUAGGA	CUGAUGA	X	GAA	ACGUCCCU	AGGGACGUU	UCCUAGAC
4578	GGUCUAGG	CUGAUGA	X	GAA	AACGUCCC	GGGACGUUU	CCUAGACC
4579	UGGUCUAG	CUGAUGA	X	GAA	AAACGUCC	GGACGUUUC	CUAGACCA
4582	CCCUGGUC	CUGAUGA	X	GAA	AGGAAACG	CGUUUCCUA	GACCAGGG
4598	UUCCCGAG	CUGAUGA	X	GAA	ACAUGUGC	GCACAUGUU	CUCGGGAA
4599	GUUCCCGA	CUGAUGA	X	GAA	AACAUGUG	CACAUGUUC	UCGGGAAC
4601	UGGUUCCC	CUGAUGA	X	GAA	AGAACAUG	CAUGUUCUC	GGGAACCA
4614	UUAAGAUU	CUGAUGA	X	GAA	ACUGUGGU	ACCACAGUU	AAUCUUAA
4615	UUUAAGAU	CUGAUGA	X	GAA	AACUGUGG	CCACAGUUA	AUCUUAAA
4618	AGAUUUAA	CUGAUGA	X	GAA	AUUAACUG	CAGUUAAUC	UUAAAUCU
4620	AAAGAUUU	CUGAUGA	X	GAA	AGAUUAAC	GUUAAUCUU	AAAUCUUU
4621	AAAAGAUU	CUGAUGA	X	GAA	AAGAUUAA	UUAAUCUUA	AAUCUUUU
4625	CGGGAAAA	CUGAUGA	X	GAA	AUUUAAGA	UCUUAAAUC	UUUUCCCG
4627	CCCGGGAA	CUGAUGA	X	GAA	AGAUUUAA	UUAAAUCUU	UUCCCGGG
4628	UCCCGGGA	CUGAUGA	X	GAA	AAGAUUUA	UAAAUCUUU	UCCCGGGA
4629	CUCCCGGG	CUGAUGA	X	GAA	AAAGAUUU	AAAUCUUUU	CCCGGGAG
4630	ACUCCCGG	CUGAUGA	X	GAA	AAAAGAUU	AAUCUUUUC	CCGGGAGU
4639	CAACAGAA	CUGAUGA	X	GAA	ACUCCCGG	CCGGGAGUC	UUCUGUUG
4641	GACAACAG	CUGAUGA	X	GAA	AGACUCCC	GGGAGUCUU	CUGUUGUC
4642	AGACAACA	CUGAUGA	X	GAA	AAGACUCC	GGAGUCUUC	UGUUGUCU
4646	AAACAGAC	CUGAUGA	X	GAA	ACAGAAGA	UCUUCUGUU	GUCUGUUU
4649	GGUAAACA	CUGAUGA	X	GAA	ACAACAGA	UCUGUUGUC	UGUUUACC
4653	GGAUGGUA	CUGAUGA	X	GAA	ACAGACAA	UUGUCUGUU	UACCAUCC
4654	UGGAUGGU	CUGAUGA	X	GAA	AACAGACA	UGUCUGUUU	ACCAUCCA
4655	UUGGAUGG	CUGAUGA	X	GAA	AAACAGAC	GUCUGUUUA	CCAUCCAA
4660	AUGCUUUG	CUGAUGA	X	GAA	AUGGUAAA	UUUACCAUC	CAAAGCAU
4669	AUGUUAAA	CUGAUGA	X	GAA	AUGCUUUG	CAAAGCAUA	UUUAACAU
4671	ACAUGUUA	CUGAUGA	X	GAA	AUAUGCUU	AAGCAUAUU	UAACAUGU
4672	CACAUGUU	CUGAUGA	X	GAA	AAUAUGCU	AGCAUAUUU	AACAUGUG
4673	ACACAUGU	CUGAUGA	X	GAA	AAAUAUGC	GCAUAUUUA	ACAUGUGU
4682	CCCCCACU	CUGAUGA	X	GAA	ACACAUGU	ACAUGUGUC	AGUGGGGG
4698	CAGAAGCC	CUGAUGA	X	GAA	AGCGCCAC	GUGGCGCUU	GGCUUCUG

4703	GGCCUCAG	CUGAUGA	X	GAA	AGCCAAGC	GCUUGGCUU	CUGAGGCC
4704	UGGCCUCA	CUGAUGA	X	GAA	AAGCCAAG	CUUGGCUUC	UGAGGCCA
4720	GAACUGAU	CUGAUGA	X	GAA	AUGGCUCU	AGAGCCAUC	AUCAGUUC
4723	GAGGAACU	CUGAUGA	X	GAA	AUGAUGGC	GCCAUCAUC	AGUUCCUC
4727	ACUAGAGG	CUGAUGA	X	GAA	ACUGAUGA	UCAUCAGUU	CCUCUAGU
4728	CACUAGAG	CUGAUGA	X	GAA	AACUGAUG	CAUCAGUUC	CUCUAGUG
4731	UCUCACUA	CUGAUGA	X	GAA	AGGAACUG	CAGUUCCUC	UAGUGAGA
4733	CAUCUCAC	CUGAUGA	X	GAA	AGAGGAAC	GUUCCUCUA	GUGAGAUG
4745	AUGACCUC	CUGAUGA	X	GAA	AUGCAUCU	AGAUGCAUU	GAGGUCAU
4751	UUGGGUAU	CUGAUGA	X	GAA	ACCUCAAU	AUUGAGGUC	AUACCCAA
4754	AGCUUGGG	CUGAUGA	X	GAA	AUGACCUC	GAGGUCAUA	CCCAAGCU
4763	AGGCCUGC	CUGAUGA	X	GAA	AGCUUGGG	CCCAAGCUU	GCAGGCCU
4777	AGUAUGCG	CUGAUGA	X	GAA	AGGUCAGG	CCUGACCUU	CGCAUACU
4778	CAGUAUGC	CUGAUGA	X	GAA	AAGGUCAG	CUGACCUUC	GCAUACUG
4783	GUGAGCAG	CUGAUGA	X	GAA	AUGCGAAG	CUUCGCAUA	CUGCUCAC
4789	CUCCCCGU	CUGAUGA	X	GAA	AGCAGUAU	AUACUGCUC	ACGGGGAG
4799	GACCACUU	CUGAUGA	X	GAA	ACUCCCCG	CGGGGAGUU	AAGUGGUC
4800	GGACCACU	CUGAUGA	X	GAA	AACUCCCC	GGGGAGUUA	AGUGGUCC
4807	CCAAACUG	CUGAUGA	X	GAA	ACCACUUA	UAAGUGGUC	CAGUUUGG
4812	CUAGGCCA	CUGAUGA	X	GAA	ACUGGACC	GGUCCAGUU	UGGCCUAG
4813	ACUAGGCC	CUGAUGA	X	GAA	AACUGGAC	GUCCAGUUU	GGCCUAGU
4819	AACCUUAC	CUGAUGA	X	GAA	AGGCCAAA	UUUGGCCUA	GUAAGGUU
4822	GGCAACCU	CUGAUGA	X	GAA	ACUAGGCC	GGCCUAGUA	AGGUUGCC
4827	CAGUAGGC	CUGAUGA	X	GAA	ACCUUACU	AGUAAGGUU	GCCUACUG
4832	CCCAUCAG	CUGAUGA	X	GAA	AGGCAACC	GGUUGCCUA	CUGAUGGG
4843	UGGCUUUU	CUGAUGA	X	GAA	AGCCCAUC	GAUGGGCUC	AAAAGCCA
4855	CUGUUUAA	CUGAUGA	X	GAA	AUGUGGCU	AGCCACAUU	UUAAACAG
4856	CCUGUUUA	CUGAUGA	X	GAA	AAUGUGGC	GCCACAUUU	UAAACAGG
4857	ACCUGUUU	CUGAUGA	X	GAA	AAAUGUGG	CCACAUUUU	AAACAGGU
4858	AACCUGUU	CUGAUGA	X	GAA	AAAAUGUG	CACAUUUUA	AACAGGUU
4866	UGAGAUAA	CUGAUGA	X	GAA	ACCUGUUU	AAACAGGUU	UUAUCUCA
4867	UUGAGAUA	CUGAUGA	X	GAA	AACCUGUU	AACAGGUUU	UAUCUCAA
4868	CUUGAGAU	CUGAUGA	X	GAA	AAACCUGU	ACAGGUUUU	AUCUCAAG

4869	ACUUGAGA CUGAUGA X GAA AAAACCUG	CAGGUUUUA UCUCAAGU
4871	AUACUUGA CUGAUGA X GAA AUAAAACC	GGUUUUAUC UCAAGUAU
4873	UAAUACUU CUGAUGA X GAA AGAUAAAA	UUUUAUCUC AAGUAUUA
4878	UAUAUUAA CUGAUGA X GAA ACUUGAGA	UCUCAAGUA UUAAUAUA
4880	UAUAUAUU CUGAUGA X GAA AUACUUGA	UCAAGUAUU AAUAUAUA
4881	CUAUAUAU CUGAUGA X GAA AAUACUUG	CAAGUAUUA AUAUAUAG
4884	UGUCUAUA CUGAUGA X GAA AUUAAUAC	GUAUUAAUA UAUAGACA
4886	CUUGUCUA CUGAUGA X GAA AUAUUAAU	AUUAAUAUA UAGACAAG
4888	GUCUUGUC CUGAUGA X GAA AUAUAUUA	UAAUAUAUA GACAAGAC
4900	UAAUGCAU CUGAUGA X GAA AGUGUCUU	AAGACACUU AUGCAUUA
4901	AUAAUGCA CUGAUGA X GAA AAGUGUCU	AGACACUUA UGCAUUAU
4907	AACAGGAU CUGAUGA X GAA AUGCAUAA	UUAUGCAUU AUCCUGUU
4908	AAACAGGA CUGAUGA X GAA AAUGCAUA	UAUGCAUUA UCCUGUUU
4910	UAAAACAG CUGAUGA X GAA AUAAUGCA	UGCAUUAUC CUGUUUUA
4915	AUAUAUAA CUGAUGA X GAA ACAGGAUA	UAUCCUGUU UUAUAUAU
4916	GAUAUAUA CUGAUGA X GAA AACAGGAU	AUCCUGUUU UAUAUAUC
4917	GGAUAUAU CUGAUGA X GAA AAACAGGA	UCCUGUUUU AUAUAUCC
4918	UGGAUAUA CUGAUGA X GAA AAAACAGG	CCUGUUUUA UAUAUCCA
4920	AUUGGAUA CUGAUGA X GAA AUAAAACA	UGUUUUAUA UAUCCAAU
4922	UCAUUGGA CUGAUGA X GAA AUAUAAAA	UUUUAUAUA UCCAAUGA
4924	AUUCAUUG CUGAUGA X GAA AUAUAUAA	UUAUAUAUC CAAUGAAU
4933	CCCAGUUA CUGAUGA X GAA AUUCAUUG	CAAUGAAUA UAACUGGG
4935	GCCCCAGU CUGAUGA X GAA AUAUUCAU	AUGAAUAUA ACUGGGGC
4948	UGACUCUU CUGAUGA X GAA ACUCGCCC	GGGCGAGUU AAGAGUCA
4949	AUGACUCU CUGAUGA X GAA AACUCGCC	GGCGAGUUA AGAGUCAU
4955	UAGACCAU CUGAUGA X GAA ACUCUUAA	UUAAGAGUC AUGGUCUA
4961	CUUUUCUA CUGAUGA X GAA ACCAUGAC	GUCAUGGUC UAGAAAAG
4963	CCCUUUUC CUGAUGA X GAA AGACCAUG	CAUGGUCUA GAAAAGGG
4974	UACAGAGA CUGAUGA X GAA ACCCCUUU	AAAGGGGUU UCUCUGUA
4975	GUACAGAG CUGAUGA X GAA AACCCCUU	AAGGGGUUU CUCUGUAC
4976	GGUACAGA CUGAUGA X GAA AAACCCCU	AGGGGUUUC UCUGUACC
4978	UGGGUACA CUGAUGA X GAA AGAAACCC	GGGUUUCUC UGUACCCA
4982	GAUUUGGG CUGAUGA X GAA ACAGAGAA	UUCUCUGUA CCCAAAUC

4990	ACCAGCCC	CUGAUGA	X	GAA	AUUUGGGU	ACCCAAAUC GGGCUGGU
4999	CUUGGUCC	CUGAUGA	X	GAA	ACCAGCCC	GGGCUGGUU GGACCAAG
5029	GCUGGGAC	CUGAUGA	X	GAA	ACCACUCU	AGAGUGGUU GUCCCAGC
5032	AUAGCUGG	CUGAUGA	X	GAA	ACAACCAC	GUGGUUGUC CCAGCUAU
5039	AGUAACUA	CUGAUGA	X	GAA	AGCUGGGA	UCCCAGCUA UAGUUACU
5041	UUAGUAAC	CUGAUGA	X	GAA	AUAGCUGG	CCAGCUAUA GUUACUAA
5044	AGUUUAGU	CUGAUGA	X	GAA	ACUAUAGC	GCUAUAGUU ACUAAACU
5045	UAGUUUAG	CUGAUGA	X	GAA	AACUAUAG	CUAUAGUUA CUAAACUA
5048	GAGUAGUU	CUGAUGA	X	GAA	AGUAACUA	UAGUUACUA AACUACUC
5053	UGGGUGAG	CUGAUGA	X	GAA	AGUUUAGU	ACUAAACUA CUCACCCA
5056	CUUUGGGU	CUGAUGA	X	GAA	AGUAGUUU	AAACUACUC ACCCAAAG
5066	GAGGUCCC	CUGAUGA	X	GAA	ACUUUGGG	CCCAAAGUU GGGACCUC
5074	AAGCCAGU	CUGAUGA	X	GAA	AGGUCCCA	UGGGACCUC ACUGGCUU
5082	GUAAAGAG	CUGAUGA	X	GAA	AGCCAGUG	CACUGGCUU CUCUUUAC
5083	AGUAAAGA	CUGAUGA	X	GAA	AAGCCAGU	ACUGGCUUC UCUUUACU
5085	GAAGUAAA	CUGAUGA	X	GAA	AGAAGCCA	UGGCUUCUC UUUACUUC
5087	AUGAAGUA	CUGAUGA	X	GAA	AGAGAAGC	GCUUCUCUU UACUUCAU
5088	GAUGAAGU	CUGAUGA	X	GAA	AAGAGAAG	CUUCUCUUU ACUUCAUC
5089	UGAUGAAG	CUGAUGA	X	GAA	AAAGAGAA	UUCUCUUUA CUUCAUCA
5092	CCAUGAUG	CUGAUGA	X	GAA	AGUAAAGA	UCUUUACUU CAUCAUGG
5093	UCCAUGAU	CUGAUGA	X	GAA	AAGUAAAG	CUUUACUUC AUCAUGGA
5096	AAAUCCAU	CUGAUGA	X	GAA	AUGAAGUA	UACUUCAUC AUGGAUUU
5103	GAUGGUGA	CUGAUGA	X	GAA	AUCCAUGA	UCAUGGAUU UCACCAUC
5104	GGAUGGUG	CUGAUGA	X	GAA	AAUCCAUG	CAUGGAUUU CACCAUCC
5105	GGGAUGGU	CUGAUGA	X	GAA	AAAUCCAU	AUGGAUUUC ACCAUCCC
5111	UGCCUUGG	CUGAUGA	X	GAA	AUGGUGAA	UUCACCAUC CCAAGGCA
5122	UCCUCUCA	CUGAUGA	X	GAA	ACUGCCUU	AAGGCAGUC UGAGAGGA
5134	AUACUCUU	CUGAUGA	X	GAA	AGCUCCUC	GAGGAGCUA AAGAGUAU
5141	UGGGCUGA	CUGAUGA	X	GAA	ACUCUUUA	UAAAGAGUA UCAGCCCA
5143	UAUGGGCU	CUGAUGA	X	GAA	AUACUCUU	AAGAGUAUC AGCCCAUA
5151	UUAAUAAA	CUGAUGA	X	GAA	AUGGGCUG	CAGCCCAUA UUUAUUAA
5153	GCUUAAUA	CUGAUGA	X	GAA	AUAUGGGC	GCCCAUAUU UAUUAAGC
5154	UGCUUAAU	CUGAUGA	X	GAA	AAUAUGGG	CCCAUAUUU AUUAAGCA

5155	GUGCUUAA	CUGAUGA	X	GAA	AAAUAUGG	CCAUAUUUA	UUAAGCAC
5157	AAGUGCUU	CUGAUGA	X	GAA	AUAAAUAU	AUAUUUAUU	AAGCACUU
5158	AAAGUGCU	CUGAUGA	X	GAA	AAUAAAUA	UAUUUAUUA	AGCACUUU
5165	GGAGCAUA	CUGAUGA	X	GAA	AGUGCUUA	UAAGCACUU	UAUGCUCC
5166	AGGAGCAU	CUGAUGA	X	GAA	AAGUGCUU	AAGCACUUU	AUGCUCCU
5167	AAGGAGCA	CUGAUGA	X	GAA	AAAGUGCU	AGCACUUUA	UGCUCCUU
5172	GUGCCAAG	CUGAUGA	X	GAA	AGCAUAAA	UUUAUGCUC	CUUGGCAC
5175	GCUGUGCC	CUGAUGA	X	GAA	AGGAGCAU	AUGCUCCUU	GGCACAGC
5195	GCAUAAAU	CUGAUGA	X	GAA	ACACAUCA	UGAUGUGUA	AUUUAUGC
5198	CUUGCAUA	CUGAUGA	X	GAA	AUUACACA	UGUGUAAUU	UAUGCAAG
5199	GCUUGCAU	CUGAUGA	X	GAA	AAUUACAC	GUGUAAUUU	AUGCAAGC
5200	AGCUUGCA	CUGAUGA	X	GAA	AAAUUACA	UGUAAUUUA	UGCAAGCU
5209	UGGAGAGG	CUGAUGA	X	GAA	AGCUUGCA	UGCAAGCUC	CCUCUCCA
5213	UAGCUGGA	CUGAUGA	X	GAA	AGGGAGCU	AGCUCCCUC	UCCAGCUA
5215	CCUAGCUG	CUGAUGA	X	GAA	AGAGGGAG	CUCCCUCUC	CAGCUAGG
5221	CUGAGUCC	CUGAUGA	X	GAA	AGCUGGAG	CUCCAGCUA	GGACUCAG
5227	AAUAUCCU	CUGAUGA	X	GAA	AGUCCUAG	CUAGGACUC	AGGAUAUU
5233	UUGACUAA	CUGAUGA	X	GAA	AUCCUGAG	CUCAGGAUA	UUAGUCAA
5235	CAUUGACU	CUGAUGA	X	GAA	AUAUCCUG	CAGGAUAUU	AGUCAAUG
5236	UCAUUGAC	CUGAUGA	X	GAA	AAUAUCCU	AGGAUAUUA	GUCAAUGA
5239	GGCUCAUU	CUGAUGA	X	GAA	ACUAAUAU	AUAUUAGUC	AAUGAGCC
5250	UUCCUUUU	CUGAUGA	X	GAA	AUGGCUCA	UGAGCCAUC	AAAAGGAA
5273	AAAUAAGA	CUGAUGA	X	GAA	AGGUUUUU	AAAAACCUA	UCUUAUUU
5275	GAAAAUAA	CUGAUGA	X	GAA	AUAGGUUU	AAACCUAUC	UUAUUUUC
5277	AUGAAAAU	CUGAUGA	X	GAA	AGAUAGGU	ACCUAUCUU	AUUUUCAU
5278	GAUGAAAA	CUGAUGA	X	GAA	AAGAUAGG	CCUAUCUUA	UUUUCAUC
5280	CAGAUGAA	CUGAUGA	X	GAA	AUAAGAUA	UAUCUUAUU	UUCAUCUG
5281	ACAGAUGA	CUGAUGA	X	GAA	AAUAAGAU	AUCUUAUUU	UCAUCUGU
5282	AACAGAUG	CUGAUGA	X	GAA	AAAUAAGA	UCUUAUUUU	CAUCUGUU
5283	AAACAGAU	CUGAUGA	X	GAA	AAAAUAAG	CUUAUUUUC	AUCUGUUU
5286	AUGAAACA	CUGAUGA	X	GAA	AUGAAAAU	AUUUUCAUC	UGUUUCAU
5290	AGGUAUGA	CUGAUGA	X	GAA	ACAGAUGA	UCAUCUGUU	UCAUACCU
5291	AAGGUAUG	CUGAUGA	X	GAA	AACAGAUG	CAUCUGUUU	CAUACCUU

5292	CAAGGUAU	CUGAUGA X GAA	AAACAGAU		AUCUGUUUC	AUACCUUG
5295	AGACAAGG	CUGAUGA X GAA	AUGAAACA		UGUUUCAUA	CCUUGUCU
5299	CCCCAGAC	CUGAUGA X GAA	AGGUAUGA		UCAUACCUU	GUCUGGGG
5302	AGACCCCA	CUGAUGA X GAA	ACAAGGUA		UACCUUGUC	UGGGGUCU
5309	CGUCAUUA	CUGAUGA X GAA	ACCCCAGA		UCUGGGGUC	UAAUGACG
5311	AUCGUCAU	CUGAUGA X GAA	AGACCCCA		UGGGGUCUA	AUGACGAU
5331	CCCAUGUC	CUGAUGA X GAA	ACCCUGUU		AACAGGGUA	GACAUGGG
5350	CCCUUUUC	CUGAUGA X GAA	ACCCUGUC		GACAGGGUA	GAAAAGGG
5367	ACCCCAAA	CUGAUGA X GAA	AGCGGGCA		UGCCCGCUC	UUUGGGGU
5369	AGACCCCA	CUGAUGA X GAA	AGAGCGGG		CCCGCUCUU	UGGGGUCU
5370	UAGACCCC	CUGAUGA X GAA	AAGAGCGG		CCGCUCUUU	GGGGUCUA
5376	CAUCUCUA	CUGAUGA X GAA	ACCCCAAA		UUUGGGGUC	UAGAGAUG
5378	CUCAUCUC	CUGAUGA X GAA	AGACCCCA		UGGGGUCUA	GAGAUGAG
5395	AUUUUAGA	CUGAUGA X GAA	ACCCAGGG		CCCUGGGUC	UCUAAAAU
5397	CCAUUUUA	CUGAUGA X GAA	AGACCCAG		CUGGGUCUC	UAAAAUGG
5399	AGCCAUUU	CUGAUGA X GAA	AGAGACCC		GGGUCUCUA	AAAUGGCU
5408	UUCUAAGA	CUGAUGA X GAA	AGCCAUUU		AAAUGGCUC	UCUUAGAA
5410	ACUUCUAA	CUGAUGA X GAA	AGAGCCAU		AUGGCUCUC	UUAGAAGU
5412	CAACUUCU	CUGAUGA X GAA	AGAGAGCC		GGCUCUCUU	AGAAGUUG
5413	ACAACUUC	CUGAUGA X GAA	AAGAGAGC		GCUCUCUUA	GAAGUUGU
5419	GCACAUAC	CUGAUGA X GAA	ACUUCUAA		UUAGAAGUU	GUAUGUGC
5422	UUUGCACA	CUGAUGA X GAA	ACAACUUC		GAAGUUGUA	UGUGCAAA
5432	CAGACCAU	CUGAUGA X GAA	AUUUGCAC		GUGCAAAUU	AUGGUCUG
5433	ACAGACCA	CUGAUGA X GAA	AAUUUGCA		UGCAAAUUA	UGGUCUGU
5438	AGCACACA	CUGAUGA X GAA	ACCAUAAU		AUUAUGGUC	UGUGUGCU
5447	CACGACCU	CUGAUGA X GAA	AGCACACA		UGUGUGCUU	AGGUCGUG
5448	GCACGACC	CUGAUGA X GAA	AAGCACAC		GUGUGCUUA	GGUCGUGC
5452	GUGUGCAC	CUGAUGA X GAA	ACCUAAGC		GCUUAGGUC	GUGCACAC
5475	CCAGCUGU	CUGAUGA X GAA	ACCGGCUC		GAGCCGGUC	ACAGCUGG
5497	AAAGCAGC	CUGAUGA X GAA	AUUCAUCG		CGAUGAAUA	GCUGCUUU
5504	CUCUCCCA	CUGAUGA X GAA	AGCAGCUA		UAGCUGCUU	UGGGAGAG
5505	GCUCUCCC	CUGAUGA X GAA	AAGCAGCU		AGCUGCUUU	GGGAGAGC
5524	UAAGUGGC	CUGAUGA X GAA	AGCAUGCU		AGCAUGCUA	GCCACUUA

5531	AGAGAAUU CUGAUGA X GAA AGUGGCUA	UAGCCACUU AAUUCUCU
5532	CAGAGAAU CUGAUGA X GAA AAGUGGCU	AGCCACUUA AUUCUCUG
5535	GGUCAGAG CUGAUGA X GAA AUUAAGUG	CACUUAAUU CUCUGACC
5536	CGGUCAGA CUGAUGA X GAA AAUUAAGU	ACUUAAUUC UCUGACCG
5538	CCCGGUCA CUGAUGA X GAA AGAAUUAA	UUAAUUCUC UGACCGGG
5554	GUACCCAU CUGAUGA X GAA AUGCUGGC	GCCAGCAUC AUGGGUAC
5561	GGAGCAGG CUGAUGA X GAA ACCCAUGA	UCAUGGGUA CCUGCUCC
5568	ACACAGGG CUGAUGA X GAA AGCAGGUA	UACCUGCUC CCCUGUGU
5577	GGAUGGGG CUGAUGA X GAA ACACAGGG	CCCUGUGUA CCCCAUCC
5584	ACCUUAAG CUGAUGA X GAA AUGGGGUA	UACCCCAUC CUUAAGGU
5587	AAAACCUU CUGAUGA X GAA AGGAUGGG	CCCAUCCUU AAGGUUUU
5588	GAAAACCU CUGAUGA X GAA AAGGAUGG	CCAUCCUUA AGGUUUUC
5593	AGACAGAA CUGAUGA X GAA ACCUUAAG	CUUAAGGUU UUCUGUCU
5594	CAGACAGA CUGAUGA X GAA AACCUUAA	UUAAGGUUU UCUGUCUG
5595	UCAGACAG CUGAUGA X GAA AAACCUUA	UAAGGUUUU CUGUCUGA
5596	AUCAGACA CUGAUGA X GAA AAAACCUU	AAGGUUUUC UGUCUGAU
5600	UCUCAUCA CUGAUGA X GAA ACAGAAAA	UUUUCUGUC UGAUGAGA
5627	UCAGUGGG CUGAUGA X GAA AUUGCACU	AGUGCAAUC CCCACUGA
5660	UGCACCAA CUGAUGA X GAA AGCCACAG	CUGUGGCUC UUGGUGCA
5662	AGUGCACC CUGAUGA X GAA AGAGCCAC	GUGGCUCUU GGUGCACU
5671	UGGCUGGU CUGAUGA X GAA AGUGCACC	GGUGCACUC ACCAGCCA
5685	UACUUGUC CUGAUGA X GAA AGUCCUGG	CCAGGACUA GACAAGUA
5693	CCCUUUCC CUGAUGA X GAA ACUUGUCU	AGACAAGUA GGAAAGGG
5704	GUGGCUAG CUGAUGA X GAA AGCCCUUU	AAAGGGCUU CUAGCCAC
5705	UGUGGCUA CUGAUGA X GAA AAGCCCUU	AAGGGCUUC UAGCCACA
5707	AGUGUGGC CUGAUGA X GAA AGAAGCCC	GGGCUUCUA GCCACACU
5731	CCCUACCU CUGAUGA X GAA AUUUUCUU	AAGAAAAUC AGGUAGGG
5736	GCCAGCCC CUGAUGA X GAA ACCUGAUU	AAUCAGGUA GGGCUGGC
5754	UGGACAAA CUGAUGA X GAA AUGUCUUU	AAAGACAUC UUUGUCCA
5756	AAUGGACA CUGAUGA X GAA AGAUGUCU	AGACAUCUU UGUCCAUU
5757	GAAUGGAC CUGAUGA X GAA AAGAUGUC	GACAUCUUU GUCCAUUC
5760	UGCGAAUG CUGAUGA X GAA ACAAAGAU	AUCUUUGUC CAUUCGCA
5764	CUUUUGCG CUGAUGA X GAA AUGGACAA	UUGUCCAUU CGCAAAAG

5765	GCUUUUGC CUGAUGA X GAA AAUGGACA	UGUCCAUUC GCAAAAGC
5775	GCCGACAA CUGAUGA X GAA AGCUUUUG	CAAAAGCUC UUGUCGGC
5777	CAGCCGAC CUGAUGA X GAA AGAGCUUU	AAAGCUCUU GUCGGCUG
5780	CUGCAGCC CUGAUGA X GAA ACAAGAGC	GCUCUUGUC GGCUGCAG
5794	GCCUGACU CUGAUGA X GAA ACACACUG	CAGUGUGUA AGUCAGGC
5798	CAUCGCCU CUGAUGA X GAA ACUUACAC	GUGUAAGUC AGGCGAUG
5818	UUCUCUGG CUGAUGA X GAA AGCCUCUG	CAGAGGCUA CCAGAGAA
5852	GGAUGAGA CUGAUGA X GAA ACCUCAGG	CCUGAGGUU UCUCAUCC
5853	UGGAUGAG CUGAUGA X GAA AACCUCAG	CUGAGGUUU CUCAUCCA
5854	CUGGAUGA CUGAUGA X GAA AAACCUCA	UGAGGUUUC UCAUCCAG
5856	AUCUGGAU CUGAUGA X GAA AGAAACCU	AGGUUUCUC AUCCAGAU
5859	GAUAUCUG CUGAUGA X GAA AUGAGAAA	UUUCUCAUC CAGAUAUC
5865	UUGCUGGA CUGAUGA X GAA AUCUGGAU	AUCCAGAUA UCCAGCAA
5867	AAUUGCUG CUGAUGA X GAA AUAUCUGG	CCAGAUAUC CAGCAAUU
5875	CACCCCCC CUGAUGA X GAA AUUGCUGG	CCAGCAAUU GGGGGGUG
5896	GGACCAUC CUGAUGA X GAA AUGGUCUU	AAGACCAUA GAUGGUCC
5903	UAAUACAG CUGAUGA X GAA ACCAUCUA	UAGAUGGUC CUGUAUUA
5908	CGGAAUAA CUGAUGA X GAA ACAGGACC	GGUCCUGUA UUAUUCCG
5910	AUCGGAAU CUGAUGA X GAA AUACAGGA	UCCUGUAUU AUUCCGAU
5911	AAUCGGAA CUGAUGA X GAA AAUACAGG	CCUGUAUUA UUCCGAUU
5913	AAAAUCGG CUGAUGA X GAA AUAAUACA	UGUAUUAUU CCGAUUUU
5914	UAAAAUCG CUGAUGA X GAA AAUAAUAC	GUAUUAUUC CGAUUUUA
5919	AUUAUUAA CUGAUGA X GAA AUCGGAAU	AUUCCGAUU UUAAUAAU
5920	GAUUAUUA CUGAUGA X GAA AAUCGGAA	UUCCGAUUU UAAUAAUC
5921	AGAUUAUU CUGAUGA X GAA AAAUCGGA	UCCGAUUUU AAUAAUCU
5922	UAGAUUAU CUGAUGA X GAA AAAAUCGG	CCGAUUUUA AUAAUCUA
5925	AAUUAGAU CUGAUGA X GAA AUUAAAAU	AUUUUAAUA AUCUAAUU
5928	ACGAAUUA CUGAUGA X GAA AUUAUUAA	UUAAUAAUC UAAUUCGU
5930	UCACGAAU CUGAUGA X GAA AGAUUAUU	AAUAAUCUA AUUCGUGA
5933	UGAUCACG CUGAUGA X GAA AUUAGAUU	AAUCUAAUU CGUGAUCA
5934	AUGAUCAC CUGAUGA X GAA AAUUAGAU	AUCUAAUUC GUGAUCAU
5940	CUCUUAAU CUGAUGA X GAA AUCACGAA	UUCGUGAUC AUUAAGAG
5943	AGUCUCUU CUGAUGA X GAA AUGAUCAC	GUGAUCAUU AAGAGACU

5944	AAGUCUCU CUGAUGA X GAA AAUGAUCA	UGAUCAUUA AGAGACUU
5952	AUUUACUA CUGAUGA X GAA AGUCUCUU	AAGAGACUU UAGUAAAU
5953	CAUUUACU CUGAUGA X GAA AAGUCUCU	AGAGACUUU AGUAAAUG
5954	ACAUUUAC CUGAUGA X GAA AAAGUCUC	GAGACUUUA GUAAAUGU
5957	GGGACAUU CUGAUGA X GAA ACUAAAGU	ACUUUAGUA AAUGUCCC
5963	GGAAAAGG CUGAUGA X GAA ACAUUUAC	GUAAAUGUC CCUUUUCC
5967	UGUGGGAA CUGAUGA X GAA AGGGACAU	AUGUCCCUU UUCCCACA
5968	UUGUGGGA CUGAUGA X GAA AAGGGACA	UGUCCCUUU UCCCACAA
5969	UUUGUGGG CUGAUGA X GAA AAAGGGAC	GUCCCUUUU CCCACAAA
5970	UUUUGUGG CUGAUGA X GAA AAAAGGGA	UCCCUUUUC CCACAAAA
5981	CUUUUCUU CUGAUGA X GAA ACUUUUGU	ACAAAAGUA AAGAAAAG
5992	AAUCCCGA CUGAUGA X GAA AGCUUUUC	GAAAAGCUA UCGGGAUU
5994	AGAAUCCC CUGAUGA X GAA AUAGCUUU	AAAGCUAUC GGGAUUCU
6000	AACCAGAG CUGAUGA X GAA AUCCCGAU	AUCGGGAUU CUCUGGUU
6001	GAACCAGA CUGAUGA X GAA AAUCCCGA	UCGGGAUUC UCUGGUUC
6003	CAGAACCA CUGAUGA X GAA AGAAUCCC	GGGAUUCUC UGGUUCUG
6008	UUAAGCAG CUGAUGA X GAA ACCAGAGA	UCUCUGGUU CUGCUUAA
6009	UUUAAGCA CUGAUGA X GAA AACCAGAG	CUCUGGUUC UGCUUAAA
6014	AAGUCUUU CUGAUGA X GAA AGCAGAAC	GUUCUGCUU AAAGACUU
6015	UAAGUCUU CUGAUGA X GAA AAGCAGAA	UUCUGCUUA AAGACUUA
6022	CCAAAGCU CUGAUGA X GAA AGUCUUUA	UAAAGACUU AGCUUUGG
6023	UCCAAAGC CUGAUGA X GAA AAGUCUUU	AAAGACUUA GCUUUGGA
6027	AGGCUCCA CUGAUGA X GAA AGCUAAGU	ACUUAGCUU UGGAGCCU
6028	UAGGCUCC CUGAUGA X GAA AAGCUAAG	CUUAGCUUU GGAGCCUA
6036	AACUUUCA CUGAUGA X GAA AGGCUCCA	UGGAGCCUA UGAAAGUU
6044	GGCUGAUC CUGAUGA X GAA ACUUUCAU	AUGAAAGUU GAUCAGCC

Where "X" represents stem II region of a HH ribozyme (Hertel et al., 1992 *Nucleic Acids Res.* 20 3252). The length of stem II may be ≥ 2 base-pairs.

Table IX: Mouse *flt1* VEGF Receptor-Hairpin Ribozyme and Substrate Sequence

nt. Posi-tion	HP Ribozyme Sequence	Substrate
33	GUCCCAGC AGAA GACCAU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AUGGUCA GCU GCUGGGAC
36	GGUGUCCC AGAA GCUGAC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GUCAGCU GCU GGGACACC
50	UAAGGCAA AGAA GCGGUG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CACCGCG GUC UUGCCUUA
67	GACACCCG AGAA GCGCGU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	ACGCGCU GCU CGGGUGUC
79	CUGUGAGA AGAA GACACC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGUGUCU GCU UCUCACAG
166	GAAAGAGA AGAA GGCCUG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CAGGCCA GAC UCUCUUUC
197	CAUGAGUG AGAA GCCUCC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGAGGCA GCC CACUCAUG
214	CGGUCGUG AGAA GAGACC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGUCUCU GCC CACGACCG
266	CUCCCACA AGAA GAUGGG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCCAUCG GCC UGUGGGAG
487	GGAUGAUG AGAA GUCUUC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAAGACA GCU CAUCAUCC
501	CGUCACCC AGAA GGGGAU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AUCCCCU GCC GGGUGACG
566	CUUUGCCC AGAA GGGGUA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UACCCCU GAU GGGCAAAG
640	CGCAGUUC AGAA GUCCUA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UAGGACU GCU GAACUGCG
691	GCCGAUGG AGAA GAUAGU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	ACUAUCU GAC CCAUCGGC
703	UUGUAUUG AGAA GCCGAU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AUCGGCA GAC CAAUACAA

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736	CUGGGCUC AGAA GGCGUA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UACGCCC GCC GAGCCCAG
754	GCCCGUGG AGAA GUCUCA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGAGACU GCU CCACGGGC
766	GGACAAGA AGAA GCCCGU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	ACGGGCA GAC UCUUGUCC
871	UCCGGUCA AGAA GCUGCC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGCAGCG GAU UGACCGGA
960	CUUCACGC AGAA GGUGUA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UACACCU GUC GCGUGAAG
988	UGUUGAAA AGAA GGAACG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CGUUCCA GUC UUUCAACA
1051	CCUGCACC AGAA GCUUCC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGAAGCA GCC GGUGCAGG
1081	GCCGAUAG AGAA GUCUUC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAAGACG GUC CUAUCGGC
1090	UCAUGGAC AGAA GAUAGG ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCUAUCG GCU GUCCAUGA
1093	CUUUCAUG AGAA GCCGAU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AUCGGCU GUC CAUGAAAG
1169	AAAUAGCG AGAA GACUUC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAAGUCU GCU CGCUAUUU
1315	UUUCGUAG AGAA GAGGUU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AACCUCA GAU CUACGAAA
1363	UGCUGCCC AGAA GAUAGA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCUAUCC GCU GGGCAGCA
1604	GUCUGAGA AGAA GCCACC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGUGGCU GAC UCUCAGAC
1612	UUCCAGGG AGAA GAGAGU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	ACUCUCA GAC CCCUGGAA
1629	GGCCCGGC AGAA GUAGAU ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AUCUACA GCU GCCGGGCC
1632	GAAGGCCC AGAA GCUGUA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UACAGCU GCC GGGCCUUC
1688	UUCGGCAC AGAA GUGACA ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGUCACA GAU GUGCCGAA
1730	UCUCCUUC AGAA GGCAUC ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAUGCCA GCC GAAGGAGA

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1753	CCACACAG	AGAA	GUUUCA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGAAACU	GUC	CUGUGUGG
2017	GGUUUUGA	AGAA	GGUGUG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CACACCU	GCU	UCAAAACC
2101	ACCAAGUG	AGAA	GAGGCG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CGCCUCA	GAU	CACUUGGU
2176	UUUCAAUA	AGAA	GCGUGC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCACGCU	GUU	UAUUGAAA
2258	GUGAGGUA	AGAA	GCGCUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAGCGCA	GCC	UACCUCAC
2305	UGAGCGUG	AGAA	GCUCCA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGGAGCU	GAU	CACGCUCA
2383	CGGAAGAA	AGAA	GCUUCA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGAAGCG	GUC	UUCUUCCG
2405	GACAGGUA	AGAA	GUCUUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAAGACA	GAC	UACCUGUC
2432	GGAACUUC	AGAA	GGGUCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGACCCA	GAU	GAAGUUCC
2464	CAUAGGGC	AGAA	GUUCAC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GUGAACG	GCU	GCCCUAUG
2467	CAUCAUAG	AGAA	GCCGUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AACGGCU	GCC	CUAUGAUG
2592	CACAGUCC	AGAA	GGUGGG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCCACCU	GCC	GGACUGUG
2596	CAGCCACA	AGAA	GGCAGG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCUGCCG	GAC	UGUGGCUG
2653	GUUCGGUC	AGAA	GAGCUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAGCUCU	GAU	GACCGAAC
2743	CGAUCACC	AGAA	GAGGCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGCCUCU	GAU	GGUGAUCG
2779	GGUAGUUG	AGAA	GGUUUC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAAACCU	GUC	CAACUACC
2814	CUUGUUGA	AGAA	GAAUAA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUAUUCU	GUC	UCAACAAG
2831	AUAUGCAA	AGAA	GCGUCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGACGCA	GCC	UUGCAUAU
2895	ACUGUCUA	AGAA	GGGCUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAGCCCC	GCC	UAGACAGU

2913	GACACUUG	AGAA	GCUGAC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GUCAGCA	GCU	CAAGUGUC
2928	GAAGCUGG	AGAA	GGUGAC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GUCACCA	GCU	CCAGCUUC
2934	UUCAGGGA	AGAA	GGAGCU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGCUCCA	GCU	UCCCUGAA
3001	UGGUGAGG	AGAA	GCUUGG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCAAGCA	GCC	CCUCACCA
3022	UGUAGGAA	AGAA	GGUCUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAGACCU	GAU	UUCCUACA
3033	CACUUGGA	AGAA	GUAGGA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCCUACA	GUU	UCCAAGUG
3064	UUCUGGAG	AGAA	GAAACU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGUUUCU	GUC	CUCCAGAA
3179	CUCACAUA	AGAA	GGGUUC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAACCCU	GAU	UAUGUGAG
3357	CUUCAGGC	AGAA	GCAGAA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUCUGCA	GCC	GCCUGAAG
3360	UUCCUUCA	AGAA	GCUGCA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGCAGCC	GCC	UGAAGGAA
3379	GGGUUCUC	AGAA	GCAUGC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCAUGCG	GAU	GAGAACCC
3463	GUUCAGCA	AGAA	GGGGCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGCCCCG	GUU	UGCUGAAC
3496	UGGCUUGA	AGAA	GGUCAC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GUGACCU	GCU	UCAAGCCA
3553	UGUUUCUA	AGAA	GUAUGG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCAUACU	GAC	UAGAAACA
3615	AUCUGCAA	AGAA	GUCCUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAGGACG	GCU	UUGCAGAU
3623	AAAUGUGG	AGAA	GCAAAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUUUGCA	GAU	CCACAUUU
3650	CUCACAUC	AGAA	GAGCUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAGCUCU	GAU	GAUGUGAG
3754	UAGUGUCC	AGAA	GAUAGU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	ACUAUCA	GCU	GGACACUA
3772	GGGAGCCC	AGAA	GAGUGC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCACUCU	GCU	GGGCUCCC

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3796	UCCAGGUG	AGAA	GCUUCA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGAAGCG	GUU	CACCUGGA
3881	CUCGGCAG	AGAA	GAAAGU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	ACUUUCC	GAU	CUGCCGAG
3886	UGGGCCUC	AGAA	GAUCGG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCGAUCU	GCC	GAGGCCCA
3897	GAAGCAGA	AGAA	GGGCCU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGGCCCA	GCU	UCUGCUUC
3903	GCUGGAGA	AGAA	GAAGCU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGCUUCU	GCU	UCUCCAGC
3912	GUGGCCAC	AGAA	GGAGAA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUCUCCA	GCU	GUGGCCAC
3969	UGGAGAAC	AGAA	GGACUC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GAGUCCU	GCU	GUUCUCCA
3972	GGGUGGAG	AGAA	GCAGGA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCCUGCU	GUU	CUCCACCC
3986	GAGUUGUA	AGAA	GGGGGU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	ACCCCCA	GAC	UACAACUC
4018	UUUAGGCG	AGAA	GGGAGG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCUCCCC	GCC	CGCCUAAA
4022	AAGCUUUA	AGAA	GGCGGG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCCGCCC	GCC	UAAAGCUU
4040	GUUGUCGG	AGAA	GGUGAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUCACCA	GCC	CCGACAAC
4053	CUGUCAGG	AGAA	GGUUGU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	ACAACCA	GCC	CCUGACAG
4095	UCCUGUGG	AGAA	GAAUAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUAUUCC	GCU	CCACAGGA
4110	CGAAAAGC	AGAA	GGCUCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGAGCCA	GCU	GCUUUUCG
4113	UCACGAAA	AGAA	GCUGGC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCCAGCU	GCU	UUUCGUGA
4168	UUAGUCAA	AGAA	GCAACA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGUUGCU	GUU	UUGACUAA
4290	GGUGGGCG	AGAA	GUCGCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGCGACC	GCC	CGCCCACC
4294	GGCCGGUG	AGAA	GGCGGU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	ACCGCCC	GCC	CACCGGCC

188

189

4329	AGUCCCAC	AGAA	GCAGGG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CCCUGCA	GCU	GUGGGACU
4378	CAGAGCAG	AGAA	GUGCAU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AUGCACU	GAC	CUGCUCUG
4383	AGAGACAG	AGAA	GGUCAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUGACCU	GCU	CUGUCUCU
4388	AUAAGAGA	AGAA	GAGCAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUGCUCU	GUC	UCUCUUAU
4457	CUCCACAG	AGAA	GACGCA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGCGUCC	GUC	CUGUGGAG
4525	CCCGAAAC	AGAA	GAGGCC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGCCUCC	GCU	GUUUCGGG
4528	GGGCCCGA	AGAA	GCGGAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUCCGCU	GUU	UCGGGCCC
4643	AAACAGAC	AGAA	GAAGAC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GUCUUCU	GUU	GUCUGUUU
4650	GGAUGGUA	AGAA	GACAAC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GUUGUCU	GUU	UACCAUCC
4724	ACUAGAGG	AGAA	GAUGAU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AUCAUCA	GUU	CCUCUAGU
4771	AUGCGAAG	AGAA	GGCCUG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CAGGCCU	GAC	CUUCGCAU
4785	UCCCCGUG	AGAA	GUAUGC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCAUACU	GCU	CACGGGGA
4809	CUAGGCCA	AGAA	GGACCA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGGUCCA	GUU	UGGCCUAG
4834	UUGAGCCC	AGAA	GUAGGC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCCUACU	GAU	GGGCUCAA
4912	AUAUAUAA	AGAA	GGAUAA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUAUCCU	GUU	UUAUAUAU
5119	UCCUCUCA	AGAA	GCCUUG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CAAGGCA	GUC	UGAGAGGA
5144	UAAAUAUG	AGAA	GAUACU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGUAUCA	GCC	CAUAUUUA
5287	AGGUAUGA	AGAA	GAUGAA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUCAUCU	GUU	UCAUACCU
5363	CCCCAAAG	AGAA	GGCACC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGUGCCC	GCU	CUUUGGGG

5462	CCGGCUCC	AGAA	GGUGUG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CACACCU	GCC	GGAGCCGG
5478	GUCUGCCC	AGAA	GUGACC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGUCACA	GCU	GGGCAGAC
5486	UAUUCAUC	AGAA	GCCCAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUGGGCA	GAC	GAUGAAUA
5500	UCUCCCAA	AGAA	GCUAUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AAUAGCU	GCU	UUGGGAGA
5539	CUGGCCCG	AGAA	GAGAAU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AUUCUCU	GAC	CGGGCCAG
5564	CACAGGGG	AGAA	GGUACC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GGUACCU	GCU	CCCCUGUG
5597	UCUCAUCA	AGAA	GAAAAC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GUUUUCU	GUC	UGAUGAGA
5601	CCAGUCUC	AGAA	GACAGA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UCUGUCU	GAU	GAGACUGG
5639	GGGCUGCA	AGAA	GUCUCA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGAGACA	GCC	UGCAGCCC
5646	CCACAGUG	AGAA	GCAGGC	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	GCCUGCA	GCC	CACUGUGG
5781	CACACUGC	AGAA	GACAAG	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	CUUGUCG	GCU	GCAGUGUG
5829	CUGUUCUC	AGAA	GUUUCU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AGAAACG	GAU	GAGAACAG
5842	AAACCUCA	AGAA	GCUGUU	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	AACAGCA	GCC	UGAGGUUU
5915	UUAUUAAA	AGAA	GAAUAA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UUAUUCC	GAU	UUUAAUAA
6010	AGUCUUUA	AGAA	GAACCA	ACCAGAGAAACACACGUUGUGGUACAUUACCUGGUA	UGGUUCU	GCU	UAAAGACU

Table X: Homologous Hammerhead Ribozyme Target Sites Between Human flt-1 and KDR RNA

nt. Posi-tion	flt-1 Target Sequence	nt. Posi-tion	KDR Target Sequence
3388	CCGGGAU A UUUAUAA	3151	CCGGGAU A UUUAUAA
2174	AAUGUAU A CACAGGG	3069	AgUGUAU c CACAGGG
2990	UGCAAAU A UGGAAAU	2756	UGCAAAU u UGGAAAc
2693	CUCCCUU A UGAUGCC	2459	CUgCCUU A UGAUGCC
2981	GUUGAAU A CUGCAAA	2747	GUgGAAU u CUGCAAA
1359	UAUGGUU A AAAGAUG	2097	UgUGGUU u AAAGAUa
3390	GGGAUAU U UAUAAGA	3153	GGGAUAU U UAUAAag
3391	GGAUAUU U AUAAGAA	3154	GGAUAUU U AUAAagA
2925	ACGUGGU U AACCUGC	2691	AuGUGGU c AACCUuC
7140	UAUUUCU A GUCAUGA	2340	UAcUUCU u GUCAUcA
1785	CAAUAAU A GAAGGAA	1515	CucUAAU u GAAGGAA
2731	GAGACUU A AACUGGG	768	uuGACUU c AACUGGG
3974	GAUGACU A CCAGGGC	1466	GAgGACU u CCAGGGa
6590	UUAAUGU A GAAAGAA	2603	aaAAUGU u GAAAGAA
6705	GCCAUUU A UGACAAA	3227	aCaAUUU u UGACAgA
974	GUCAAAU U ACUUAGA	147	uUCAAAU U ACUUgcA
1872	AUAAAGU U GGGACUG	1602	AcAAAGU c GGGAgaG
2333	ACUUGGU U UAAAAAC	1088	AaaUGGU a UAAAAAu
2775	AAGUGGU U CAAGCAU	1745	AcaUGGU a CAAGCuU
3533	UUCUCCU U AGGUGGG	3296	UUuUCCU U AGGUGcu
3534	UCUCCUU A GGUGGGU	3297	UuUCCUU A GGUGcuU
3625	GUACUCU A CUCCUGA	4054	GagCUCU c CUCCUGu
1814	AGCACCU U GGUUGUG	1059	AGuACCU U GGUUacc
2744	GGCAAAU C ACUUGGA	147	uuCAAAU u ACUUGcA
2783	CAAGCAU C AGCAUUU	796	gAAGCAU C AGCAUaa

3613	GAGAGCU C CUGAGUA	2968	GgaAGCU C CUGAagA
4052	AAGGCCU C GCUCAAG	1923	ucuGCCU u GCUCAAG
5305	UCUCCAU A UCAAAAC	456	ggUCCAU u UCAAAuC
7158	AUGUAUU U UGUAUAC	631	gUcUAUU a UGUAcAu
1836	CUAGAAU U UCUGGAA	1007	aUgGAAU c UCUGGug
2565	CUCUCUU C UGGCUCC	2328	uguUCUU C UGGCUaC
4250	CUGUACU C CACCCCA	3388	uUaUACU a CACCagA
7124	ACAUGGU U UGGUCCU	3778	cagUGGU a UGGUuCU
436	AUGGUCU U UGCCUGA	1337	AcGGUCU a UGCCauu
2234	GCACCAU A CCUCCUG	1344	augCCAU u CCUCCcc
2763	GGGCUUU U GGAAAAG	990	uuGCUUU U GGAAguG
4229	CCAGACU A CAACUCG	767	auuGACU u CAACUgG
5301	GUUUUCU C CAUAUCA	3307	ugcUUCU C CAUAUCc
6015	AGAAUGU A UGCCUCU	1917	AcuAUGU c UGCCUug
6095	AUUCCCU A GUGAGCC	1438	AUaCCCU u GUGAaga
6236	UGUUGUU C CUCUUCU	76	UagUGUU u CUCUUga
5962	GCUUCCU U UUAUCCA	3099	auaUCCU c UUAUCgg
7629	UAUAUAU U CUCUGCU	3096	gAaAUAU c CUCUuaU

Lowercase letters are used to represent sequence variance between flt-1 and KDR RNA

Table XI: 2.5 μmol RNA Synthesis Cycle

Reagent	Equivalents	Amount	Wait Time*
Phosphoramidites	6.5	163μL	2.5
S-Ethyl Tetrazole	23.8	238μL	2.5
Acetic Anhydride	100	233 μL	5 sec
N-Methyl Imidazole	186	233 μL	5 sec
TCA	83.2	1.73 mL	21 sec
Iodine	8.0	1.18 mL	45 sec
Acetonitrile	NA	6.67 mL	NA

Claims

1. Nucleic acid molecule which modulates the synthesis, expression and/or stability of an mRNA encoding one or more receptors of vascular endothelial growth factor.

2. The nucleic acid of claim 1, wherein said receptor is flt-1, KDR and/or flk-1.

3. The nucleic acid of claim 1 or 2, wherein said molecule is an enzymatic nucleic acid molecule.

4. The nucleic acid molecule of claim 3, wherein, the binding arms of said enzymatic nucleic acid contain sequences complementary to the substrate nucleotide base sequences in any one of Tables II to IX.

5. The nucleic acid molecule of claims 3 or 4, wherein said nucleic acid molecule is in a hammerhead motif.

6. The enzymatic nucleic acid molecule of claim 3 or 4, wherein said nucleic acid molecule is in a hairpin, hepatitis Delta virus, group I intron, VS nucleic acid or RNaseP nucleic acid motif.

7. The enzymatic nucleic acid molecule of any of claims 3 or 4, wherein said ribozyme comprises between 12 and 100 bases complementary to the RNA of said region.

8. The enzymatic nucleic acid of claim 7, wherein said ribozyme comprises between 14 and 24 bases complementary to the RNA of said region.

9. Enzymatic nucleic acid molecule consisting essentially of any ribozyme sequence selected from those shown in Tables II to IX.

10. A mammalian cell including a nucleic acid molecule of any of claims 1, 2 or 3.

11. The cell of claim 10, wherein said cell is a human cell.

12. An expression vector comprising nucleic acid encoding the nucleic acid molecule of any of claims 1, 2, 3 or 4, in a manner which allows expression and/or delivery of that RNA molecule within a mammalian cell.

13. The expression vector of claim 12, wherein said nucleic acid is an enzymatic nucleic acid.

14. A mammalian cell including an expression vector of any of claims 12 or 13.

15. The cell of claim 14, wherein said cell is a human cell.

16. A method for treatment of a patient having a condition associated with the level of flt-1, KDR and/or flk-1, wherein the patient, tissue donor or population of corresponding cells is administered a therapeutically effective amount of an enzymatic nucleic acid molecule of claims 1, 2, 3 or 4.

17. A method for treatment of a condition related to the level of flt-1, KDR and/or flk-1 activity by administering to a patient an expression vector of claim 12.

18. The method of claims 16 or 17, wherein said patient is a human.

19. The nucleic acid of claim 1 or 2, wherein said molecule is an antisense nucleic acid molecule.

20. The nucleic acid molecule of claim 19, wherein, said antisense nucleic acid contain sequences complementary to the substrate nucleotide base sequences in any one of Tables II to IX.

21. An expression vector comprising nucleic acid encoding the antisense nucleic acid molecule of any one of claims 19 or 20, in a manner which allows expression and/or delivery of that antisense RNA molecule within a mammalian cell.

22. A mammalian cell including an expression vector of claim 21.

23. The cell of claim 22, wherein said cell is a human cell.

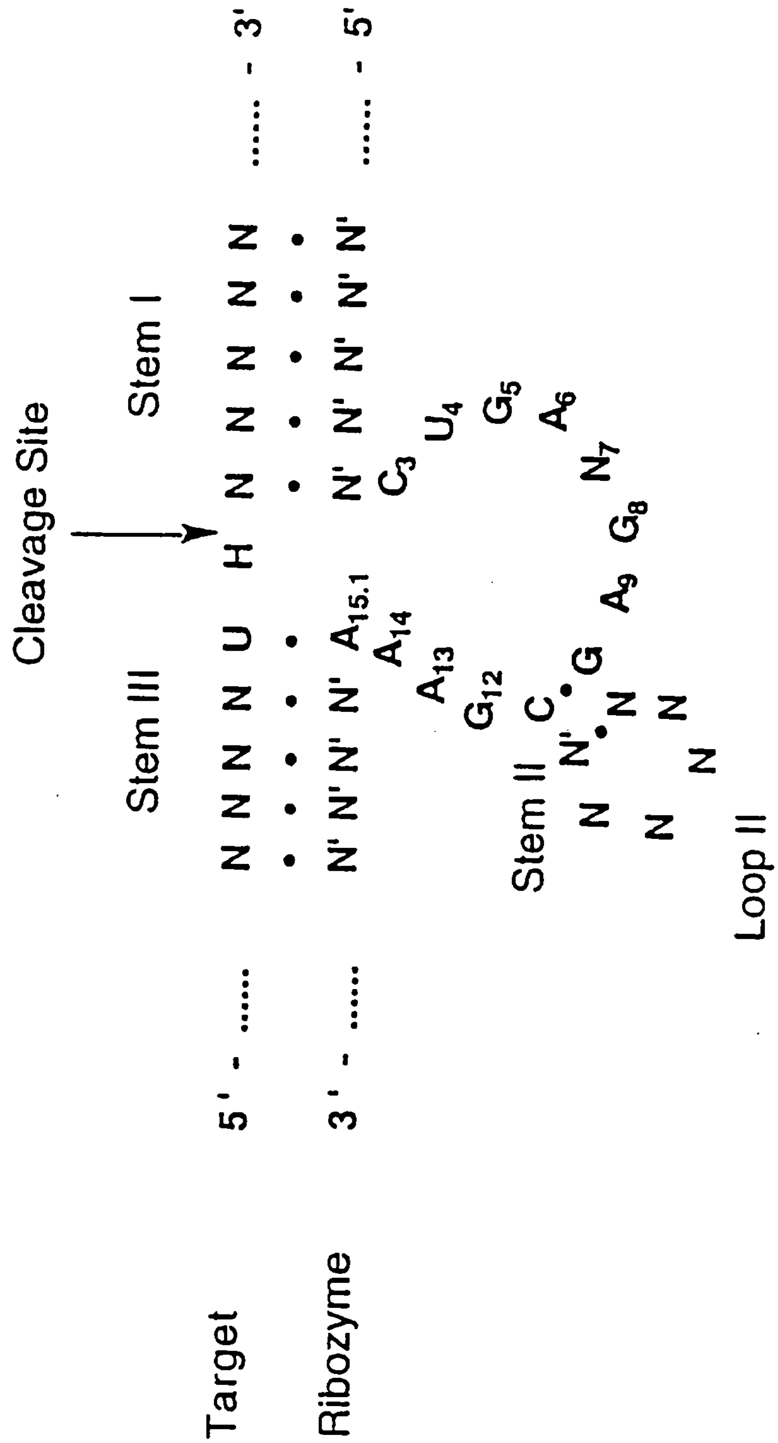

Cleavage Site
Stem I
Stem III
Stem II
Loop II
Target
Ribozyme
5' - ......
3' - ......
...... - 3'
...... - 5'

FIG. 1.

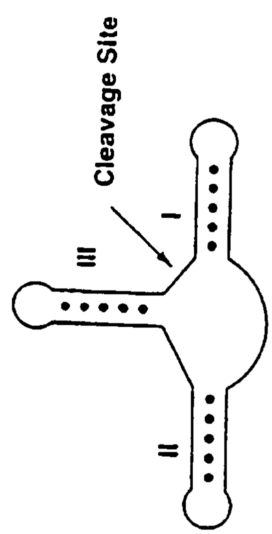


FIG. 2a.

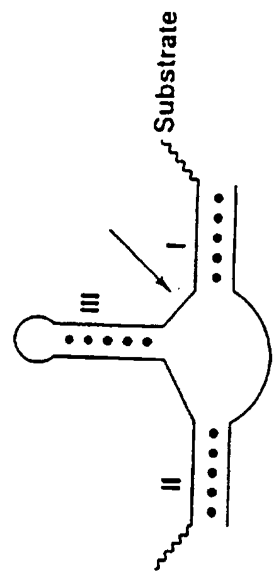


FIG. 2b.

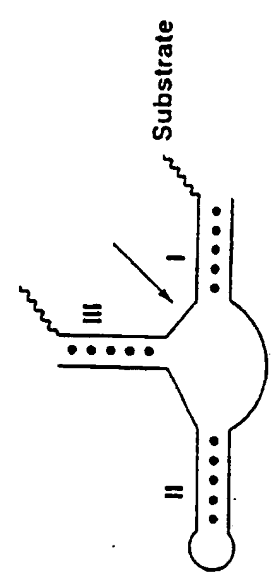


FIG. 2c.

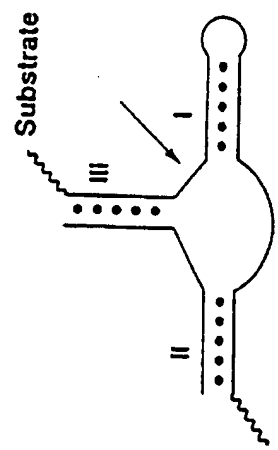


FIG. 2d.

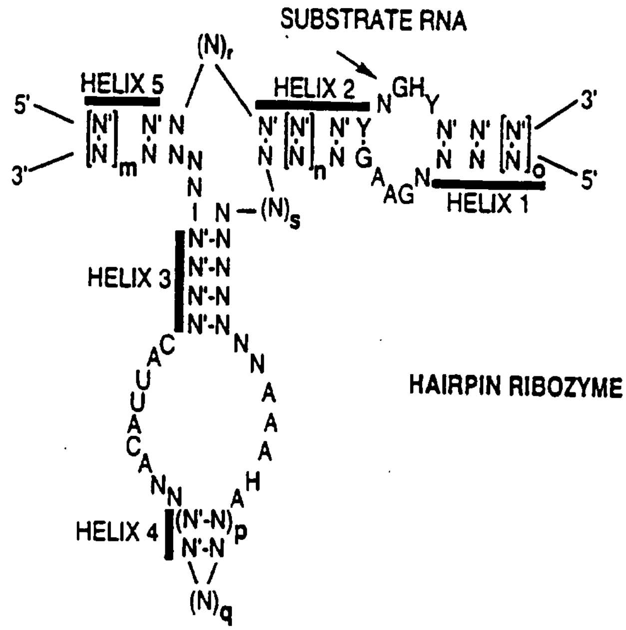

SUBSTRATE RNA
HELIX 5
HELIX 2
HELIX 1
HELIX 3
HELIX 4
HAIRPIN RIBOZYME

FIG. 3.

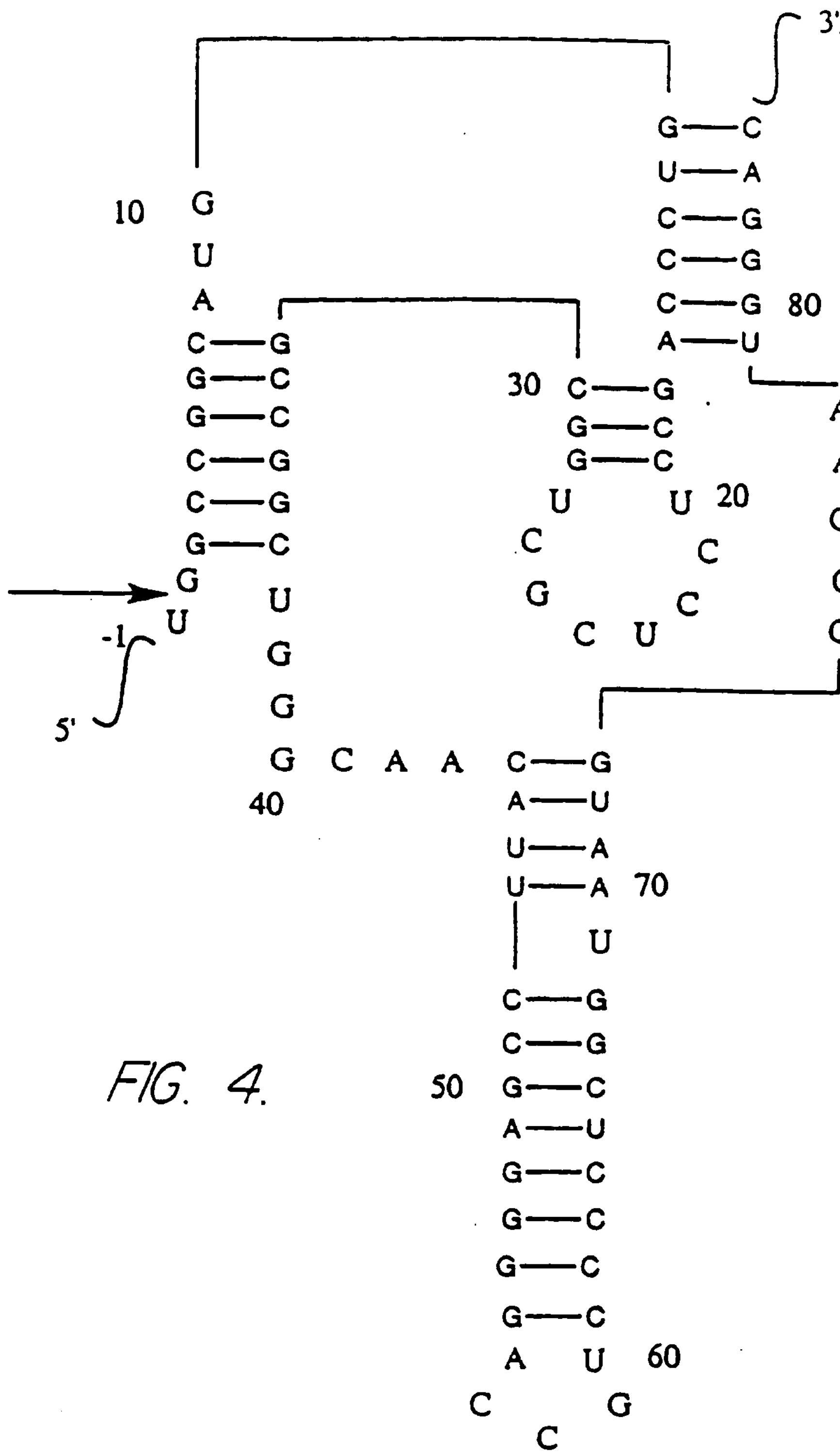


FIG. 4.

NEUROSPORA VS RNA ENZYME

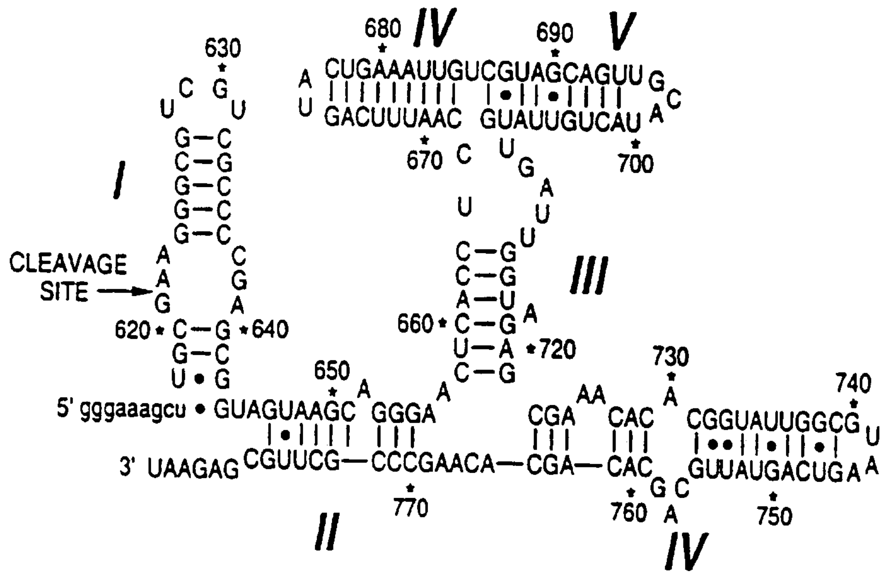


FIG. 5

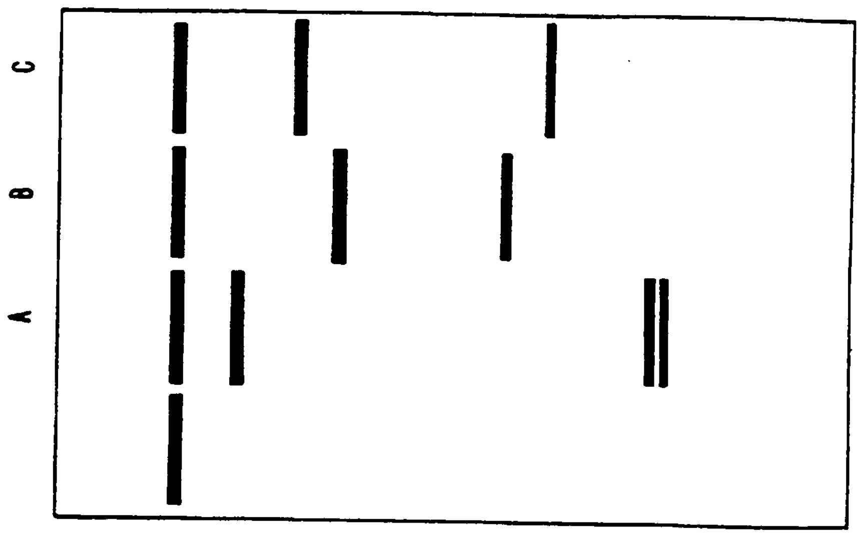
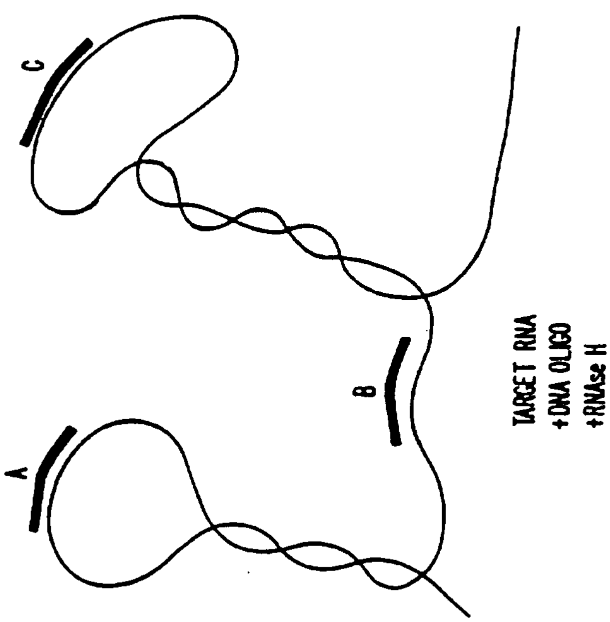


FIG. 6.



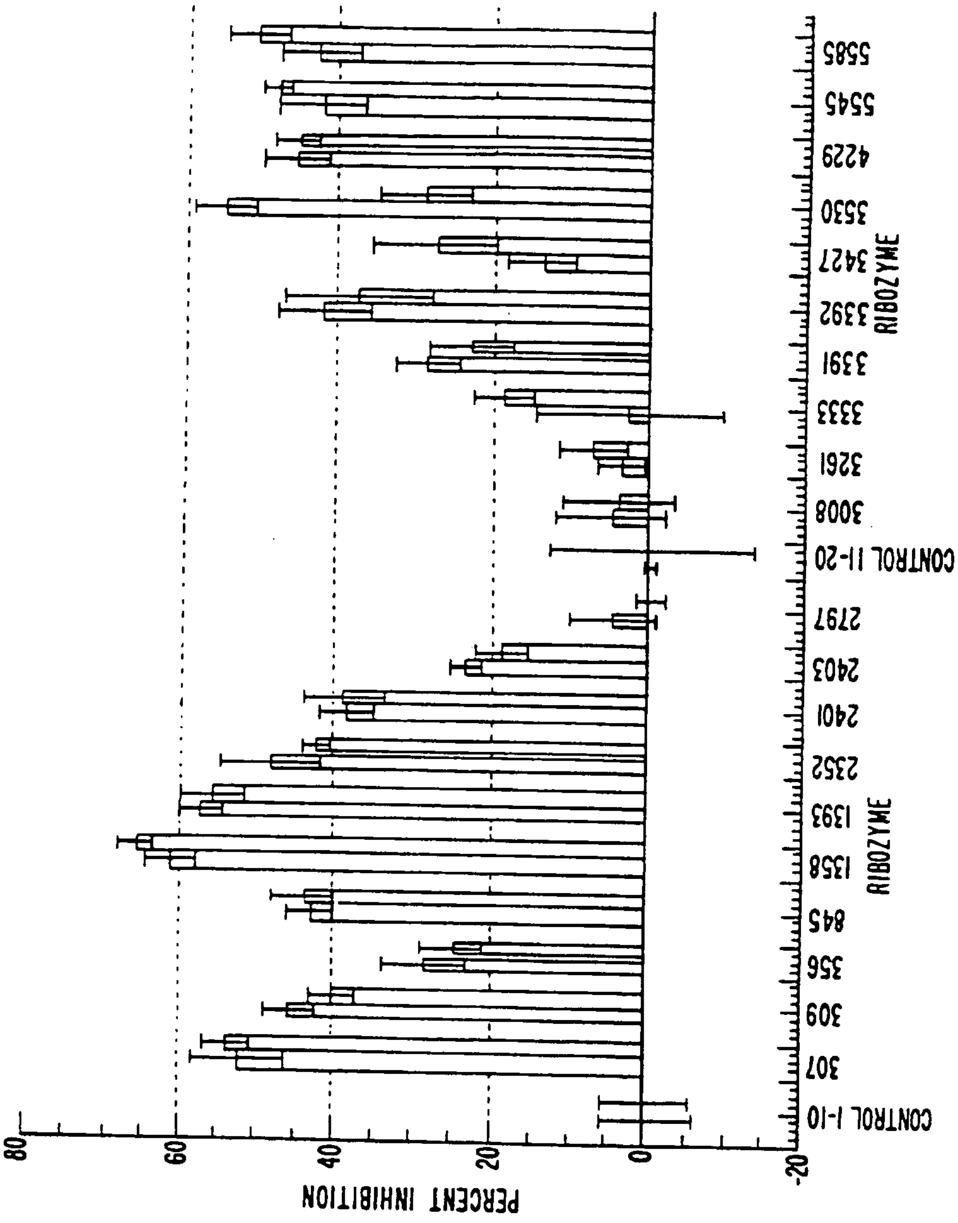

PERCENT INHIBITION
80
60
40
20
0
-20
CONTROL I-10
307
309
356
845
1358
1393
2352
2401
2403
2797
CONTROL 11-20
3008
3261
3333
3391
3392
3427
3530
4229
5545
5585
RIBOZYME
RIBOZYME

FIG. 7.

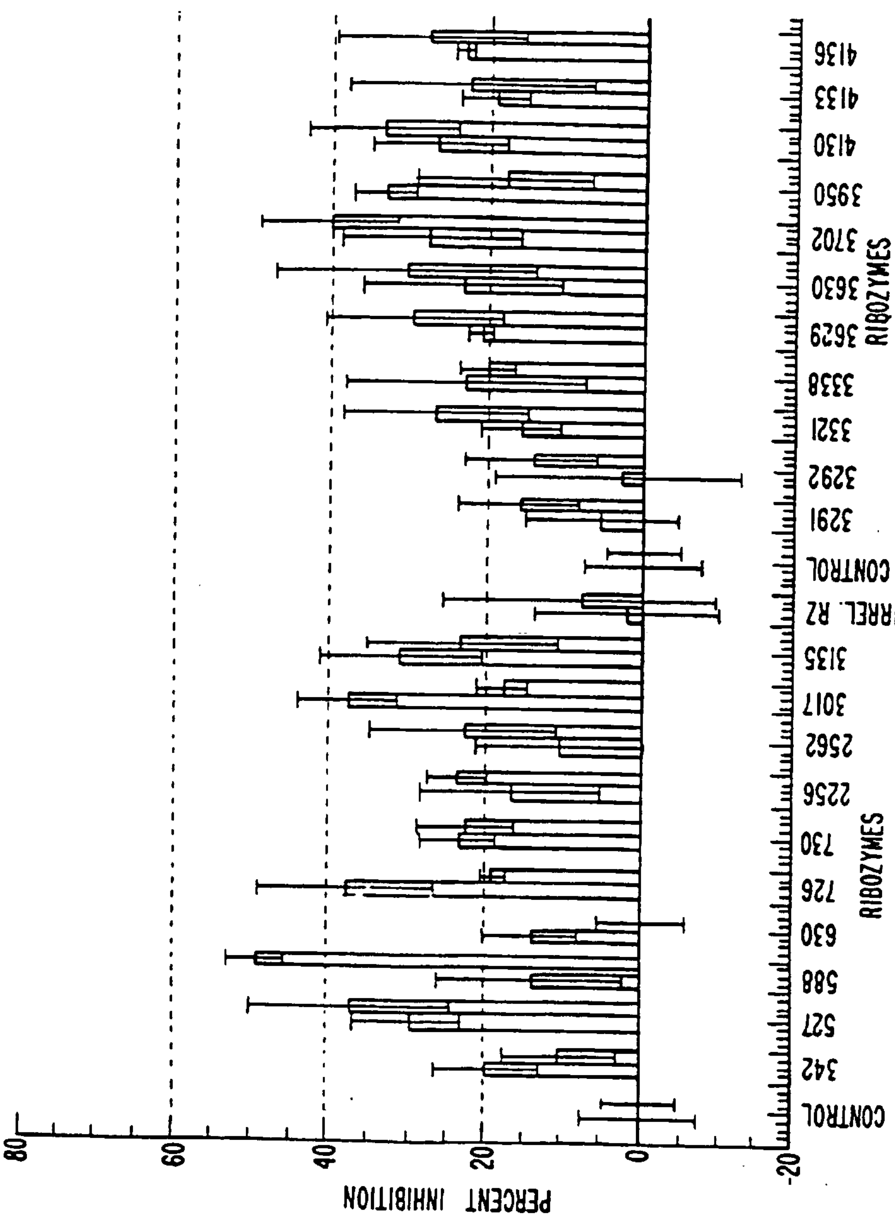

PERCENT INHIBITION
-20
0
20
40
60
80
CONTROL
342
527
588
630
726
730
2256
2562
3017
3135
IRREL. RZ
CONTROL
3291
3292
3321
3338
3629
3630
3702
3950
4130
4133
4136
RIBOZYMES
RIBOZYMES

FIG. 8

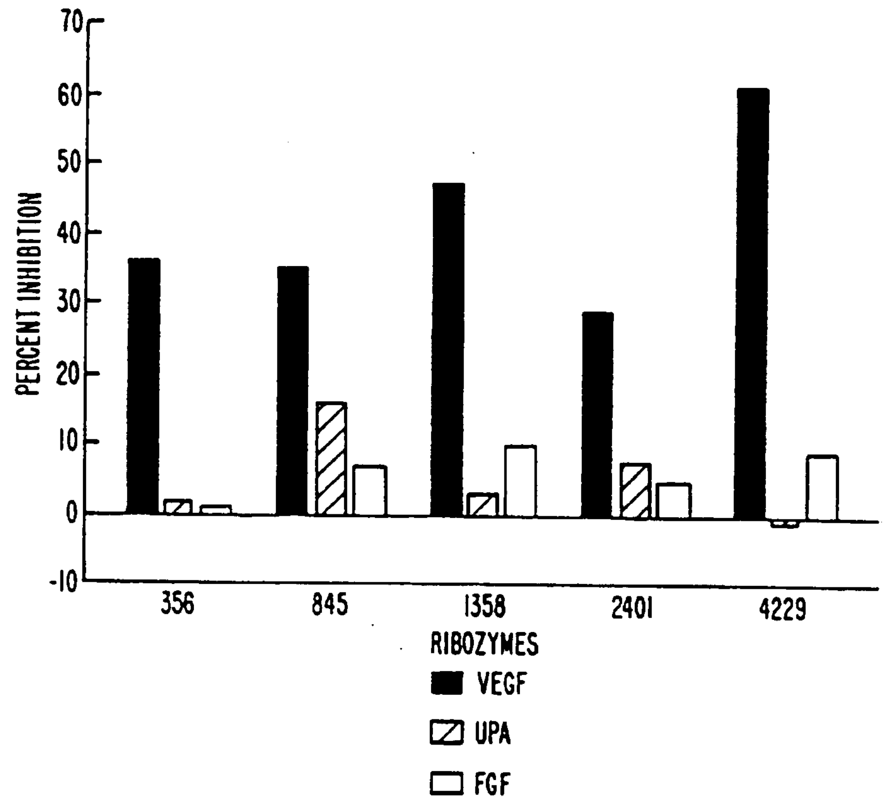
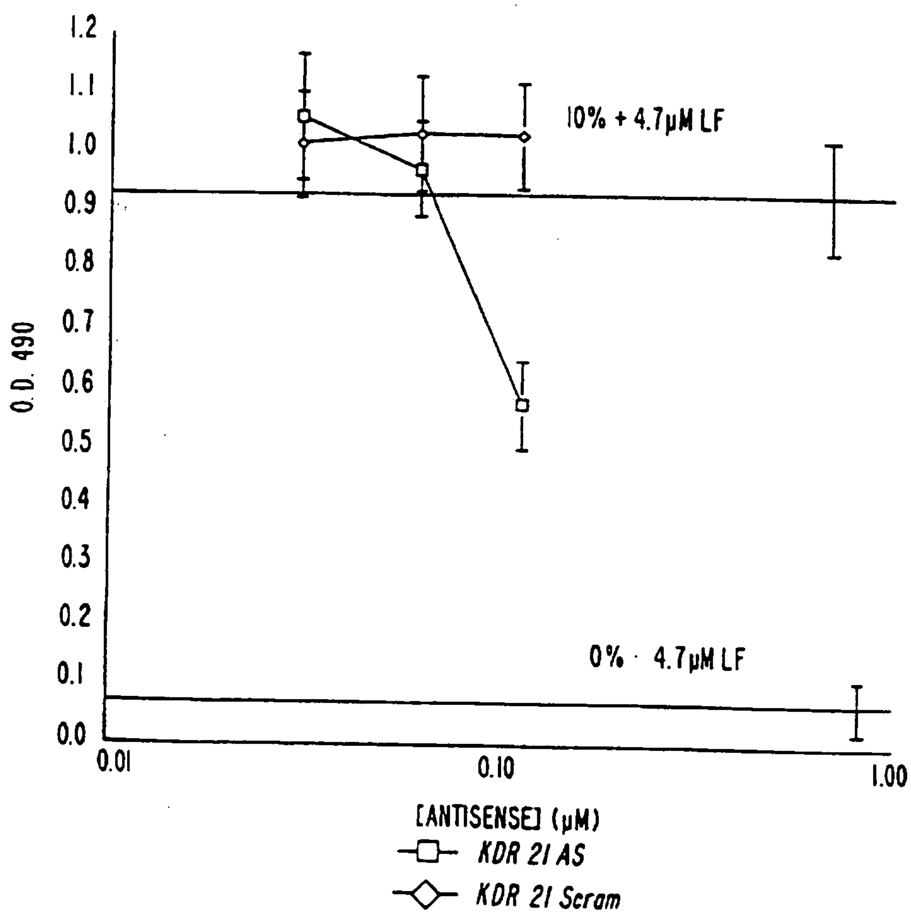

70
60
50
40
30
20
10
0
-10
PERCENT INHIBITION
356
845
1358
2401
4229
RIBOZYMES
VEGF
UPA
FGF

FIG. 9.

FIG. 10.


1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
O.D. 490
10% + 4.7μM LF
0% · 4.7μM LF
0.01
0.10
1.00
[ANTISENSE] (μM)
KDR 21 AS
KDR 21 Scram

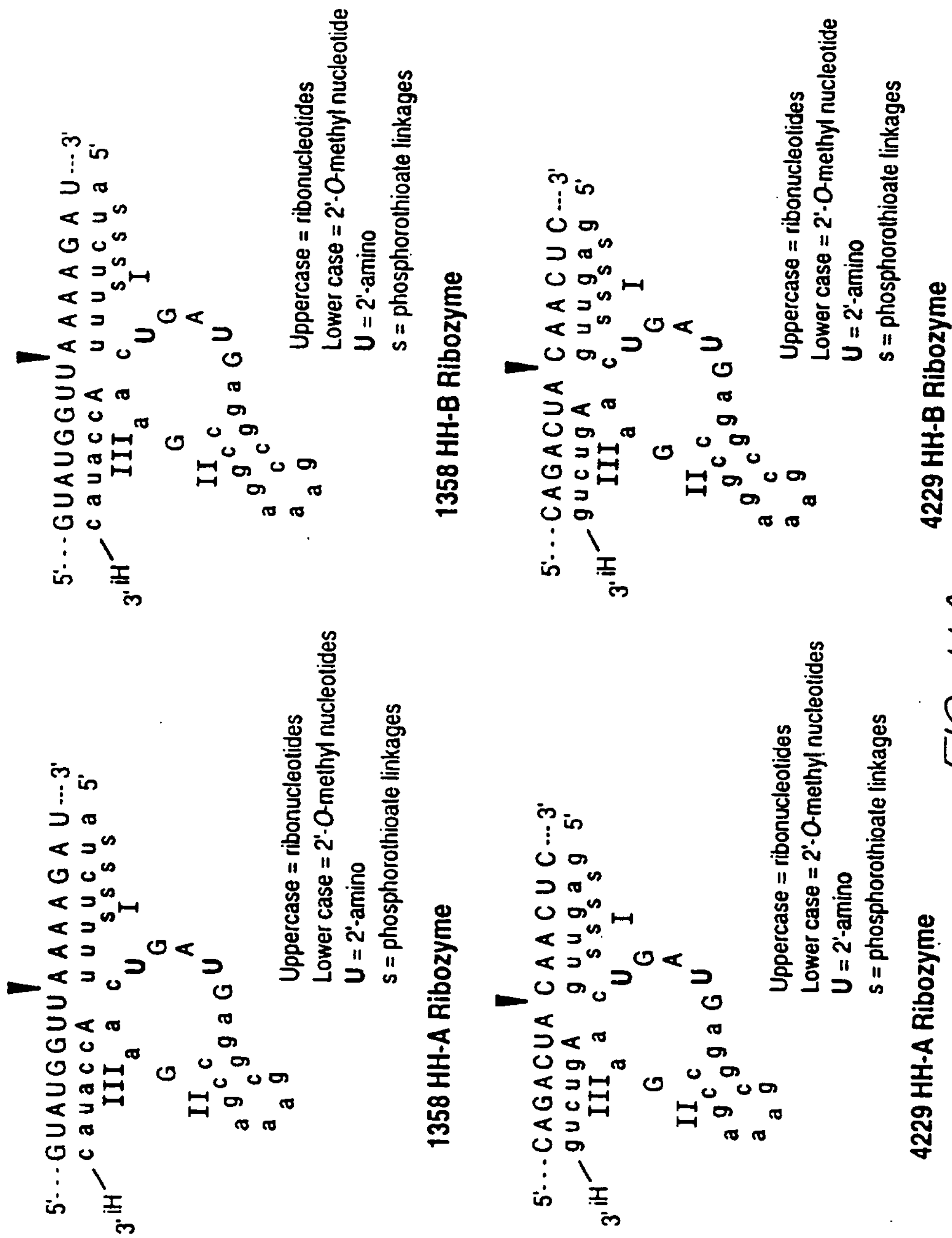

5'...GUAUGGUU AAAAGAU...3'
3' iH — cauaccA uuuucua 5'
Uppercase = ribonucleotides
Lower case = 2'-O-methyl nucleotides
U = 2'-amino
s = phosphorothioate linkages
1358 HH-A Ribozyme
1358 HH-B Ribozyme
5'...CAGACUA CAACUC...3'
3' iH — gucugA guugag 5'
4229 HH-A Ribozyme
4229 HH-B Ribozyme

FIG. 11A.

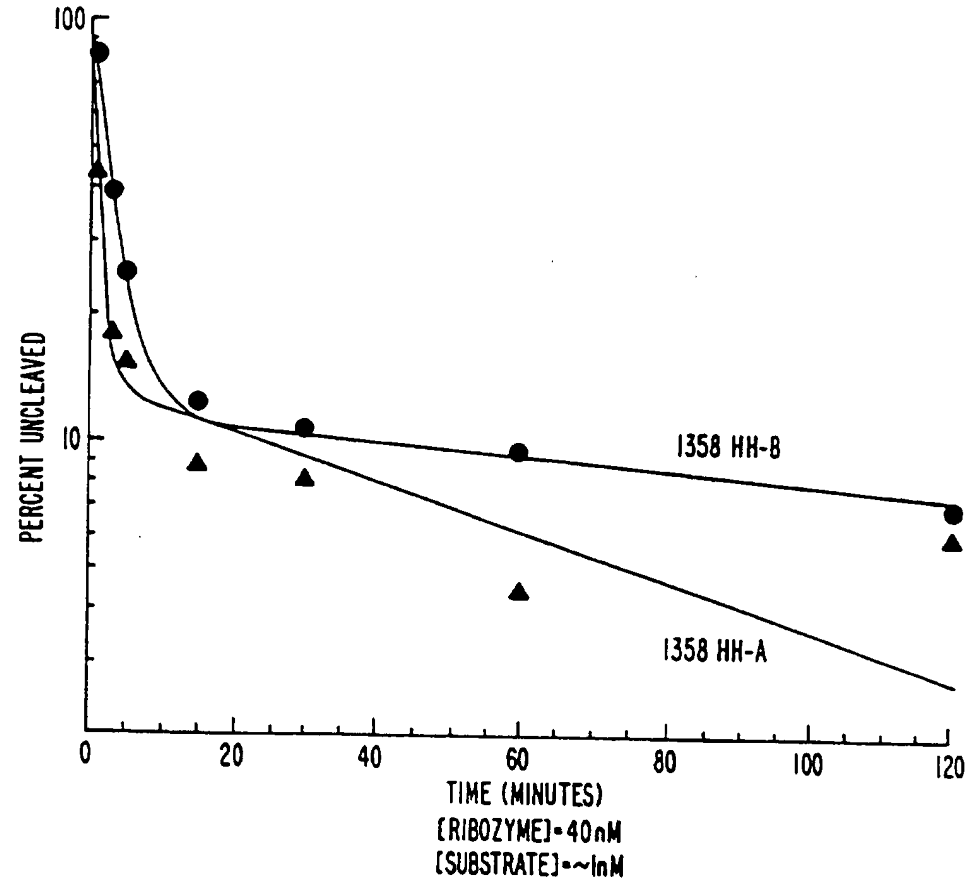
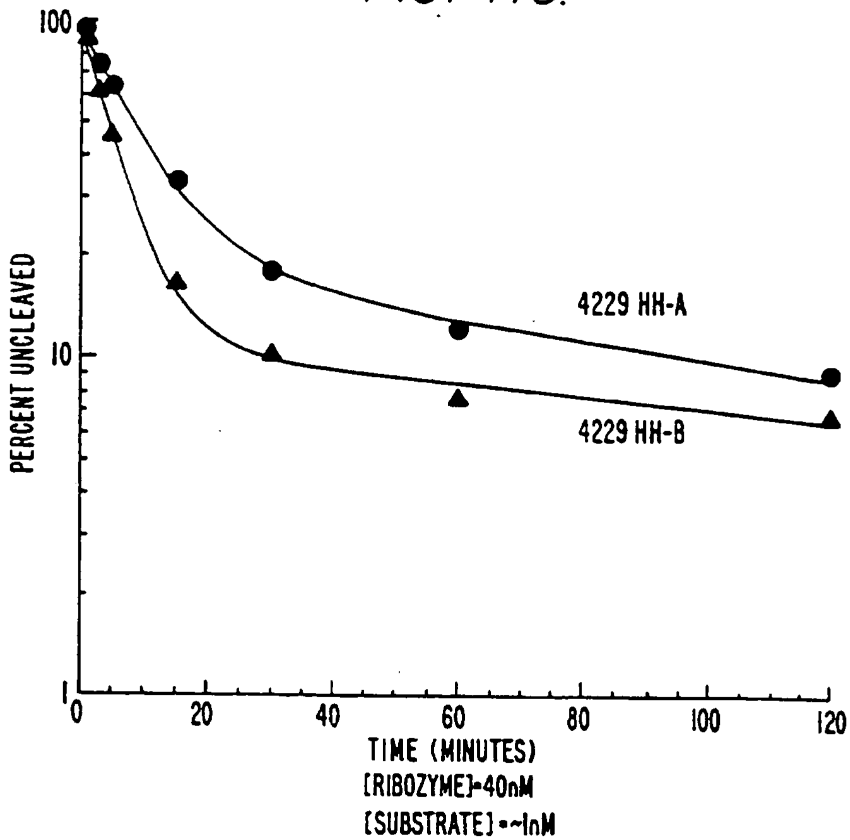

100
10
PERCENT UNCLEAVED
0
20
40
60
80
100
120
TIME (MINUTES)
1358 HH-B
1358 HH-A
[RIBOZYME]=40nM
[SUBSTRATE]=~1nM

FIG. 11B.

FIG. 11C.


100
10
1
PERCENT UNCLEAVED
0
20
40
60
80
100
120
TIME (MINUTES)
4229 HH-A
4229 HH-B
[RIBOZYME]=40nM
[SUBSTRATE]=~1nM

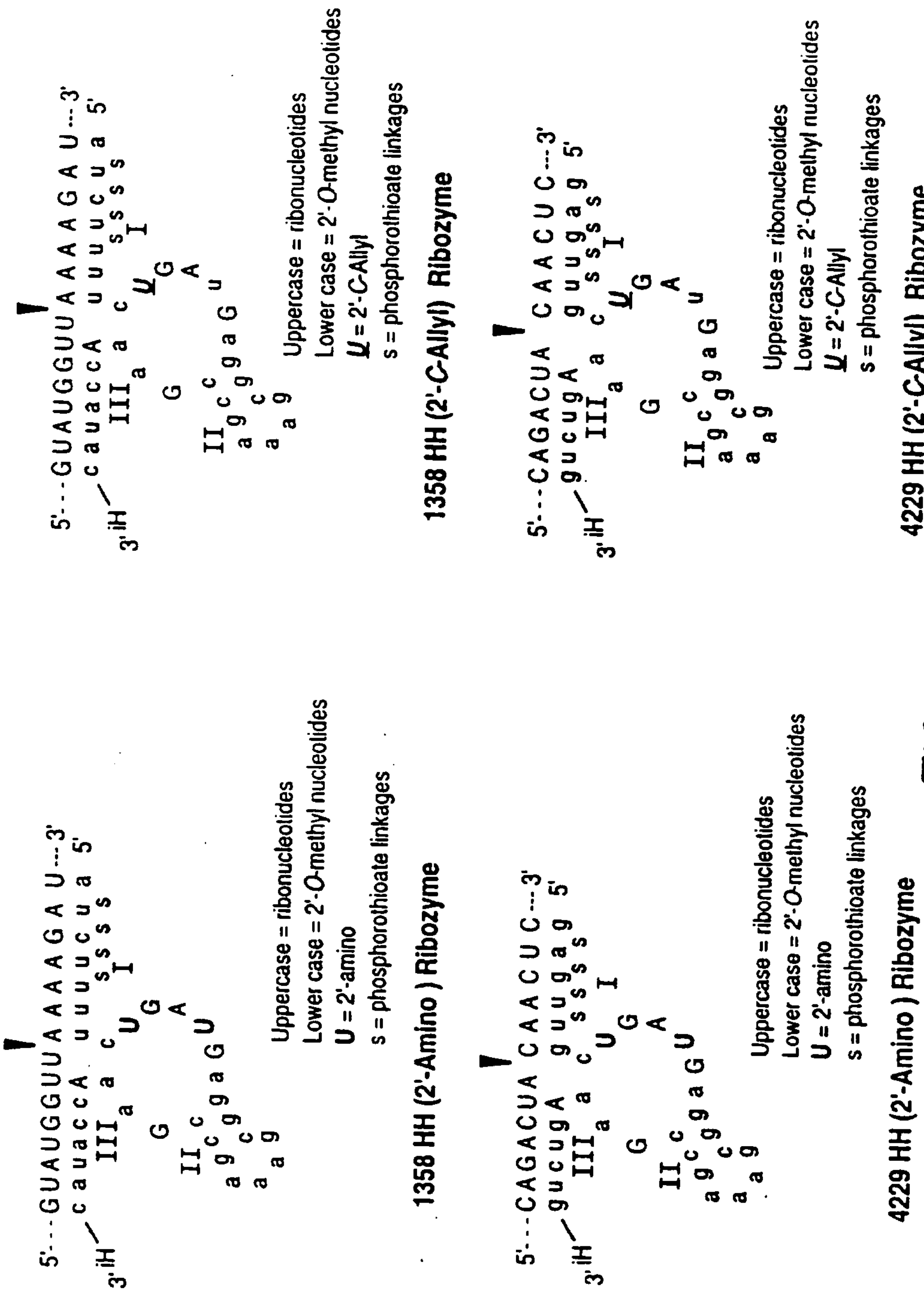

5'---GUAUGGUUAAAAGAU---3'
3'iH—cauaccA uuuucua 5'
Uppercase = ribonucleotides
Lower case = 2'-O-methyl nucleotides
U = 2'-amino
s = phosphorothioate linkages
1358 HH (2'-Amino) Ribozyme
5'---CAGACUACAACUC---3'
3'iH—gucugA guugag 5'
Uppercase = ribonucleotides
Lower case = 2'-O-methyl nucleotides
U = 2'-amino
s = phosphorothioate linkages
4229 HH (2'-Amino) Ribozyme
5'---GUAUGGUUAAAAGAU---3'
3'iH—cauaccA uuuucua 5'
Uppercase = ribonucleotides
Lower case = 2'-O-methyl nucleotides
U = 2'-C-Allyl
s = phosphorothioate linkages
1358 HH (2'-C-Allyl) Ribozyme
5'---CAGACUA CAACUC---3'
3'iH—gucugA guugag 5'
Uppercase = ribonucleotides
Lower case = 2'-O-methyl nucleotides
U = 2'-C-Allyl
s = phosphorothioate linkages
4229 HH (2'-C-Allyl) Ribozyme

FIG. 12A.

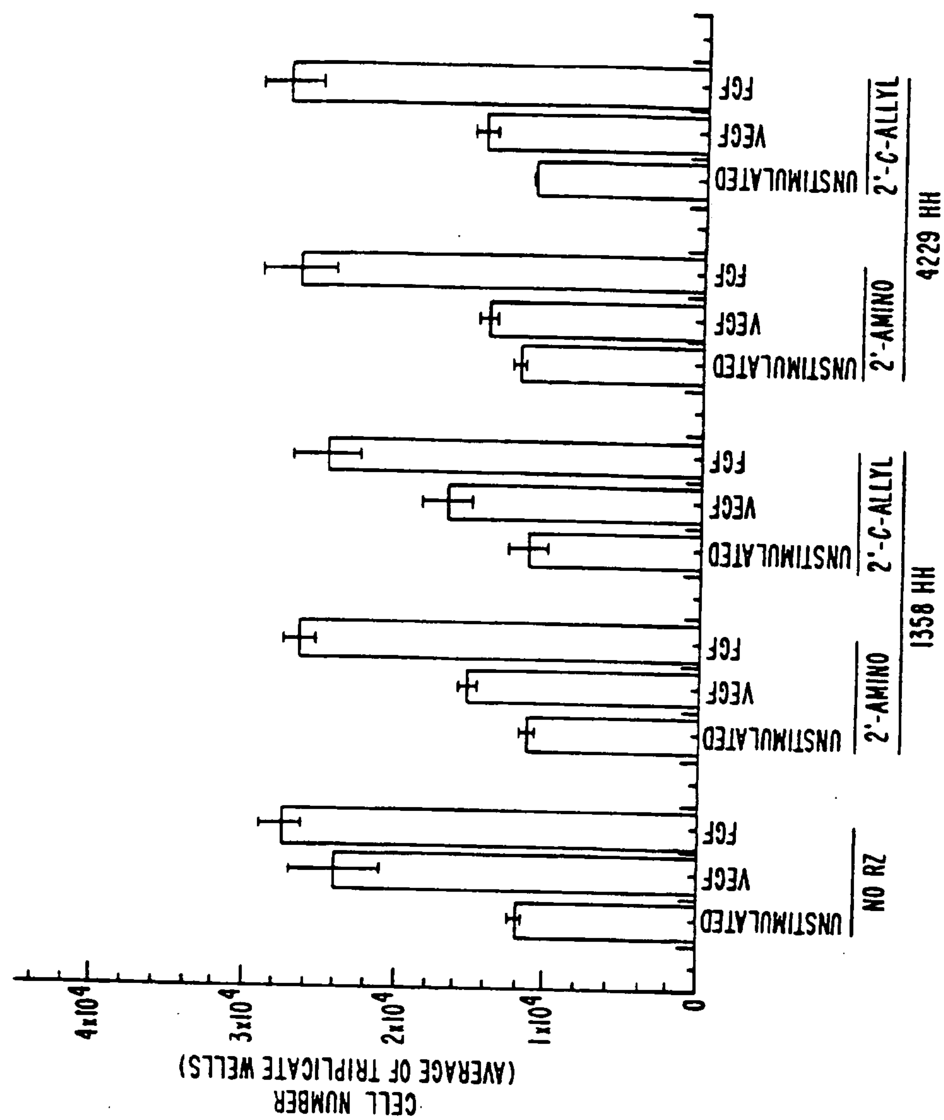

CELL NUMBER
(AVERAGE OF TRIPLICATE WELLS)
0
1x10^4
2x10^4
3x10^4
4x10^4
UNSTIMULATED
VEGF
FGF
NO RZ
2'-AMINO
2'-C-ALLYL
1358 HH
4229 HH

FIG. 12B.

FIG. 13.

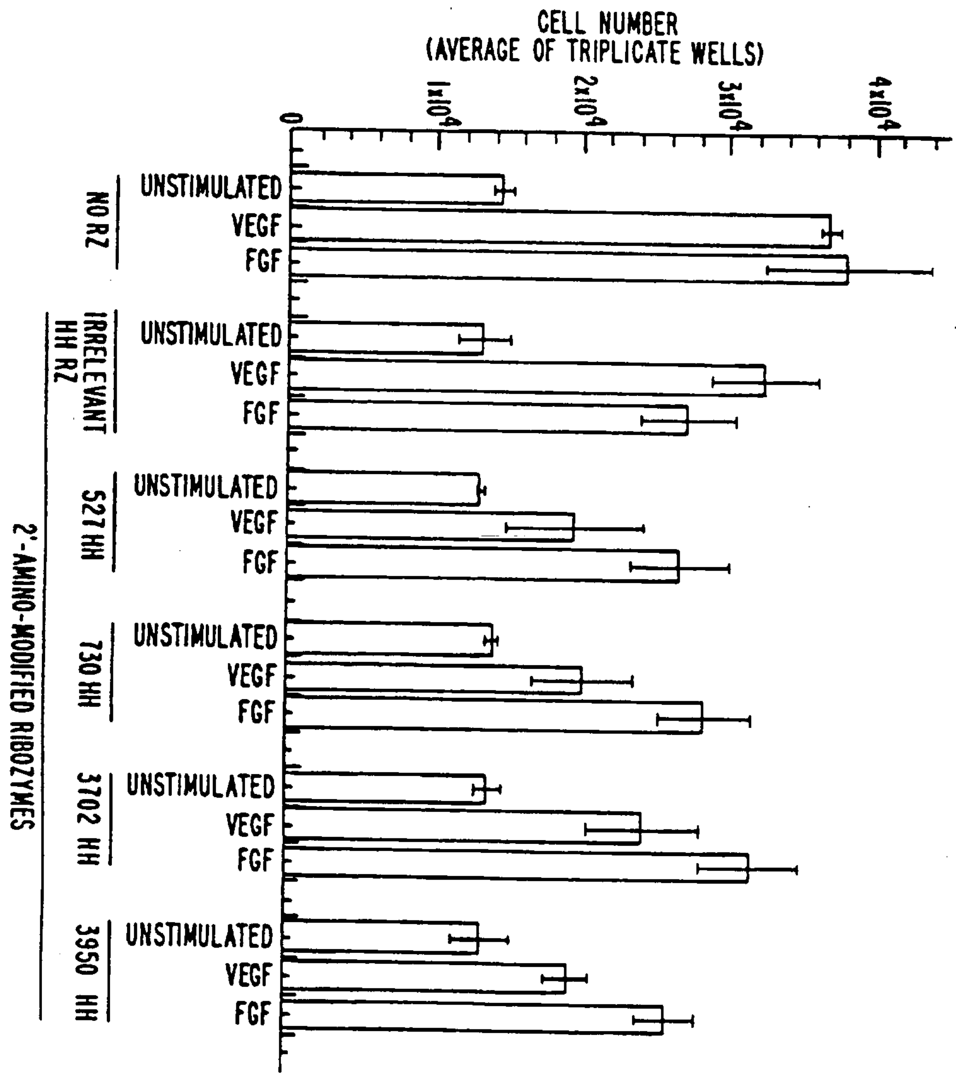

CELL NUMBER
(AVERAGE OF TRIPLICATE WELLS)
0
1x10^4
2x10^4
3x10^4
4x10^4
UNSTIMULATED
VEGF
FGF
NO RZ
IRRELEVANT HH RZ
527 HH
730 HH
3702 HH
3950 HH
2'-AMINO-MODIFIED RIBOZYMES

FIG. 14.

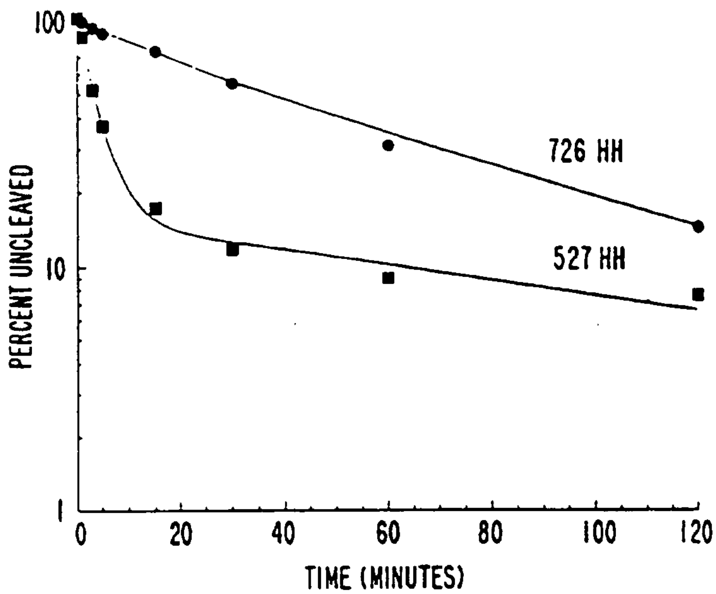

100
10
1
PERCENT UNCLEAVED
0
20
40
60
80
100
120
TIME (MINUTES)
726 HH
527 HH

FIG. 15.

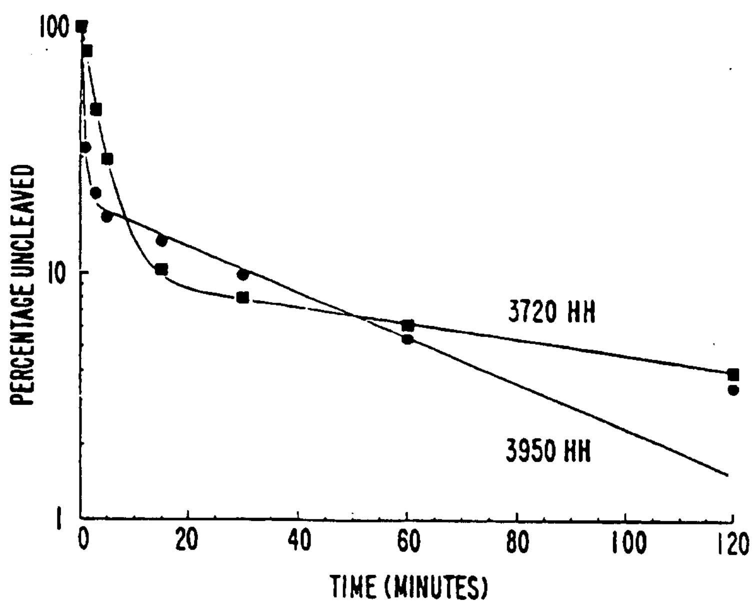

100
10
1
PERCENTAGE UNCLEAVED
0
20
40
60
80
100
120
TIME (MINUTES)
3720 HH
3950 HH

FIG. 16.

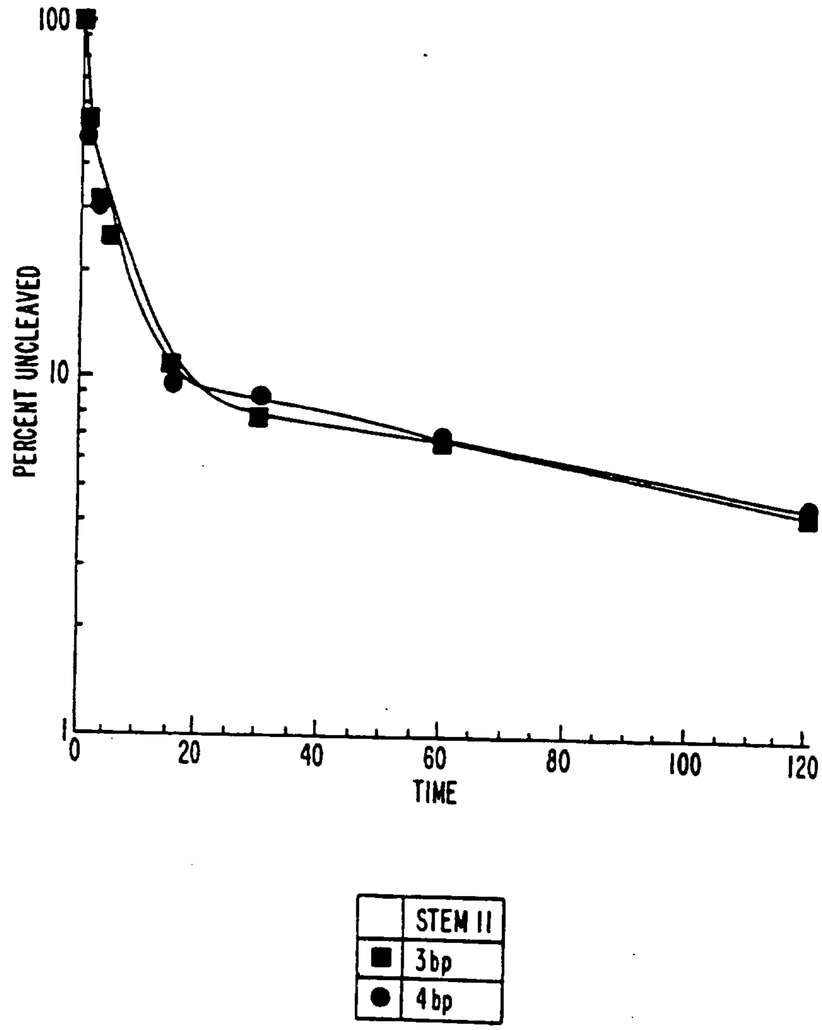

100
10
1
PERCENT UNCLEAVED
0
20
40
60
80
100
120
TIME
STEM II
3bp
4bp

FIG. 17.

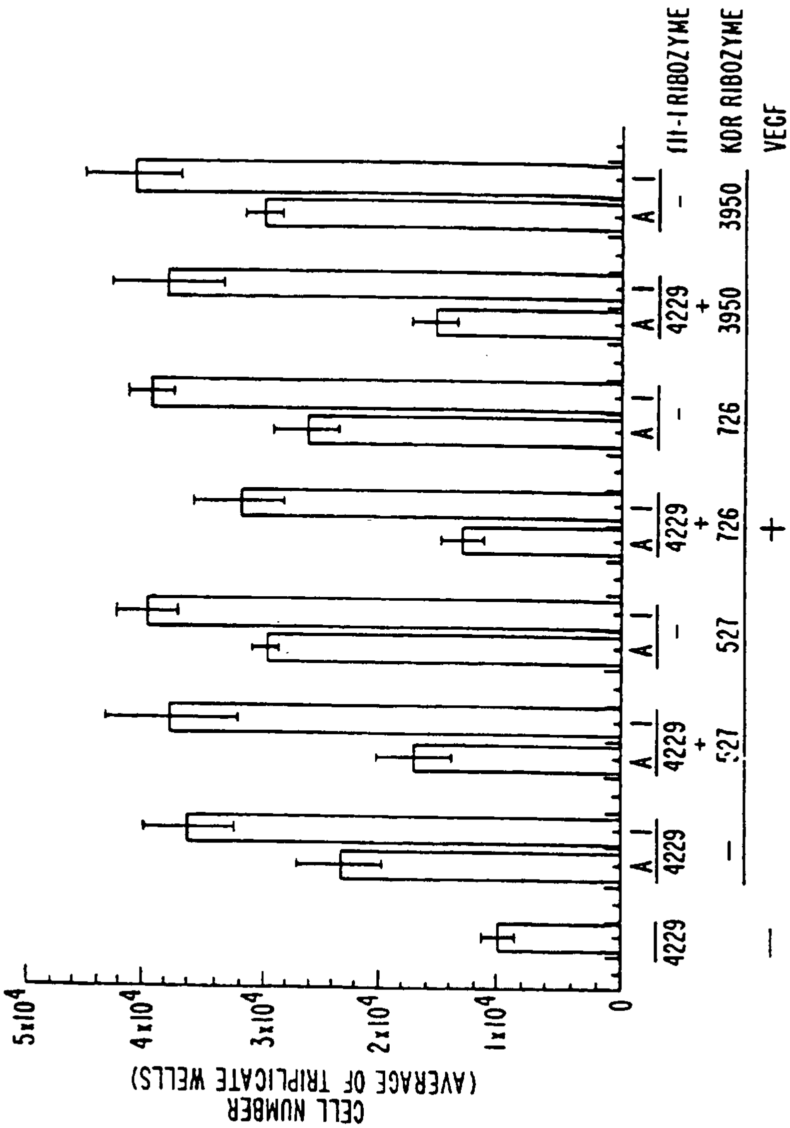
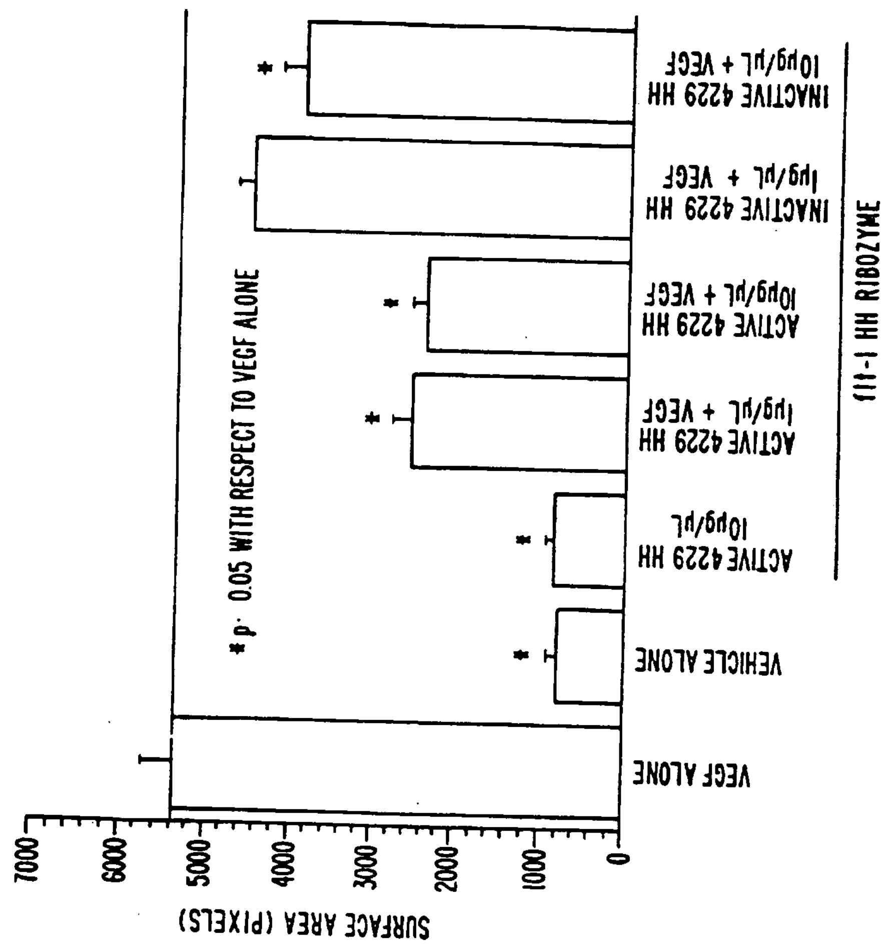

CELL NUMBER
(AVERAGE OF TRIPLICATE WELLS)
0
1x10^4
2x10^4
3x10^4
4x10^4
5x10^4
4229
A I
4229
527
726
3950
+
-
KDR RIBOZYME
VEGF

FIG. 18


SURFACE AREA (PIXELS)
7000
6000
5000
4000
3000
2000
1000
0
* p· 0.05 WITH RESPECT TO VEGF ALONE
VEGF ALONE
VEHICLE ALONE
ACTIVE 4229 HH
10µg/µL
ACTIVE 4229 HH
1µg/µL + VEGF
ACTIVE 4229 HH
10µg/µL + VEGF
INACTIVE 4229 HH
1µg/µL + VEGF
INACTIVE 4229 HH
10µg/µL + VEGF
flt-1 HH RIBOZYME